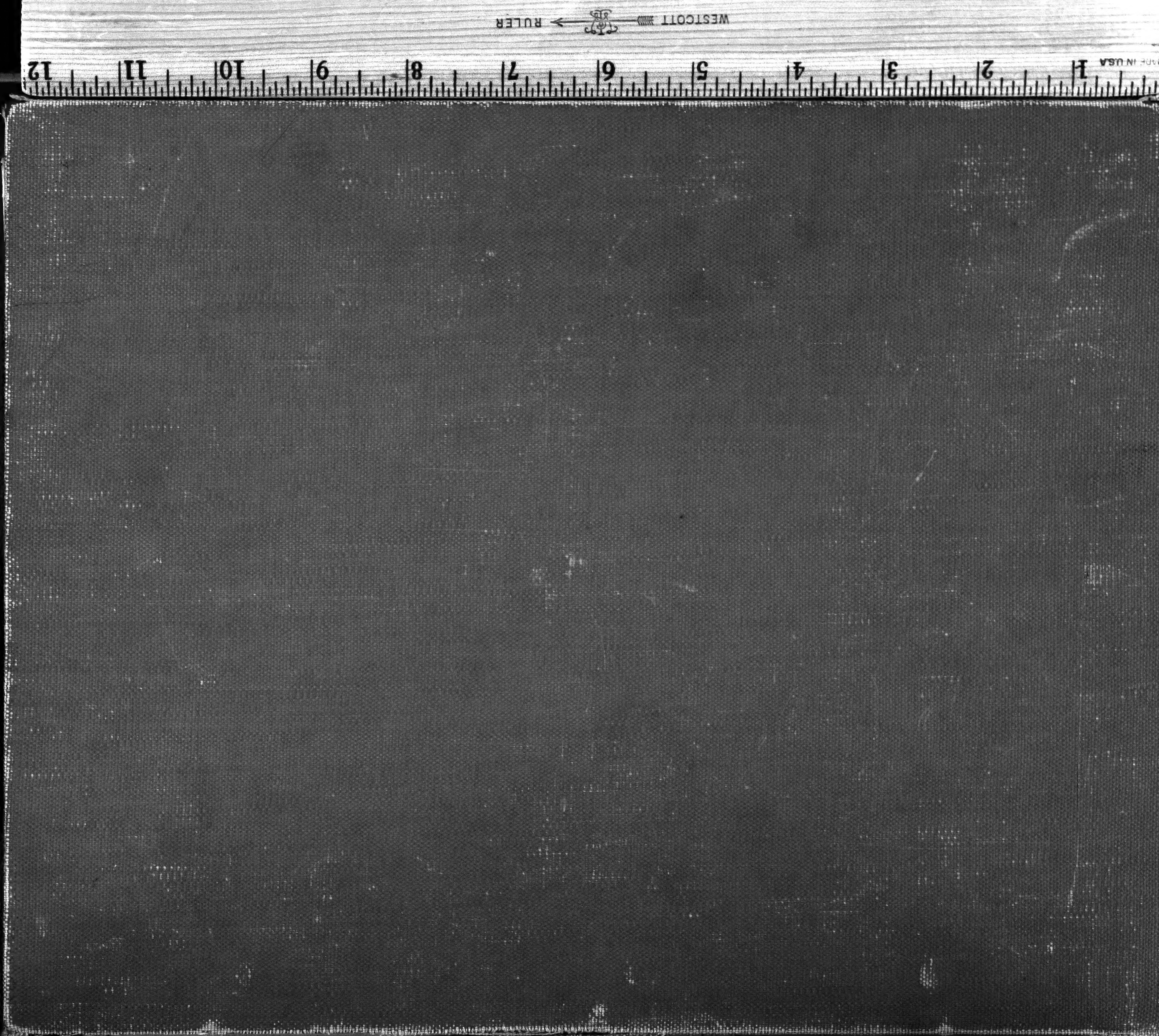
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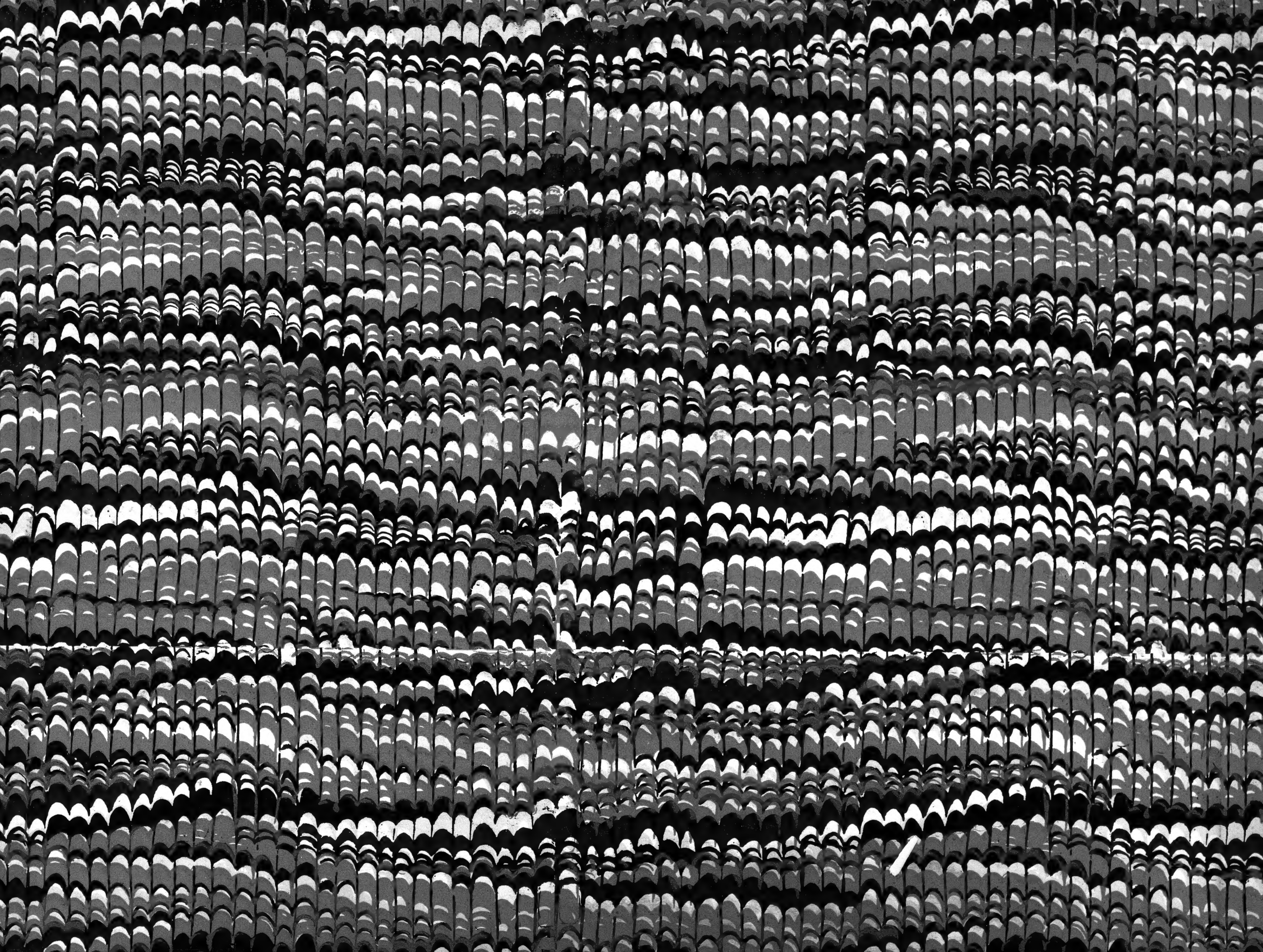

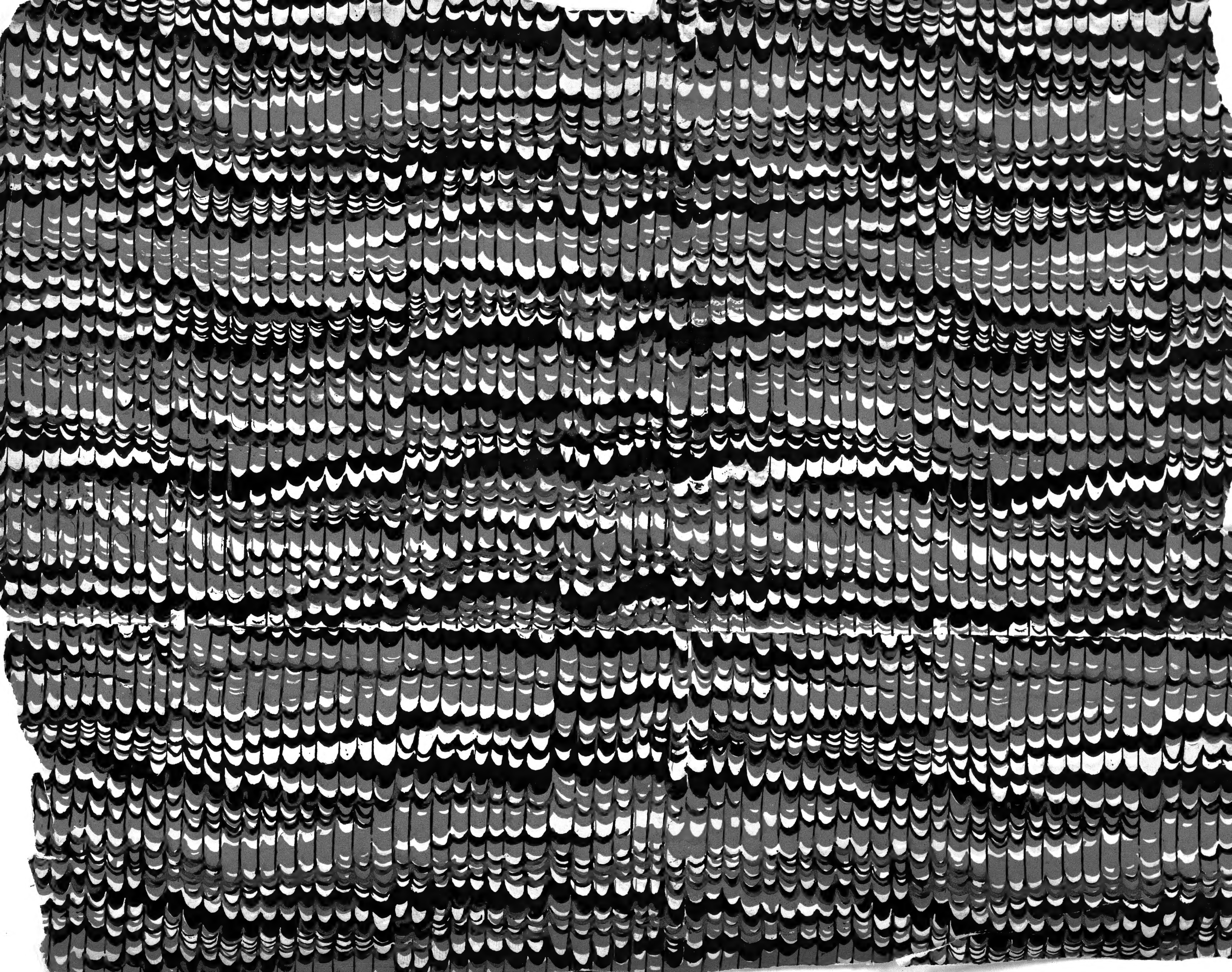

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BIOLOGIA
CENTRALI-AMERICANA.

MAMMALIA.

BY

EDWARD R. ALSTON,

SECRETARY TO THE LINNEAN SOCIETY, F.Z.S., ETC.

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With an Introduction

BY

P. L. SCLATER, M.A., Ph.D., F.R.S., &c.

1879–1882.

INTRODUCTION.

By P. L. SCLATER, M.A., Ph.D., F.R.S

At the request of Messrs. Salvin and Godman, I have had great pleasure in putting together such remarks as are required to explain the Tables which our lamented friend the Author of this volume had drawn up shortly before his death for the better understanding of the Central-American Mammal-fauna. These tables were the only part of the proposed "Introduction" that Alston left behind him; but I think they serve to show fairly enough the views upon the subject which he held, and which, I believe, do not essentially differ from those which, under the circumstances of the case, it has been left for me to put forward as the result of his investigations.

The first of these Tables gives a complete list of the Mammals of Central America recognized in this Memoir and in the Appendix thereto *. The range of each species in the various countries comprised within the Central-American area is given in parallel columns, and also details as to its extension into North America on the one hand and into South America on the other.

* Since the Appendix was finished Mr. Forrer has sent to Messrs. Salvin and Godman another small collection from the State of Durango, of which Mr. Thomas has given an account in P. Z. S. 1882 (Nov. 14th). Two species of Rodents, of which examples were contained in this collection, are new to the Central-American Mammal-fauna—namely, *Sciurus aberti* and *Tamias asiaticus*, subsp. *quadrivittatus*. In another small collection, received from the same source still more recently, three examples of *Neotoma fuscipes*, Baird, another northern Rodent new to Mexico, occurred. But I have not thought it advisable to alter Alston's tables for the purpose of including these three species.

TABLE I.—*General Distribution of Central-American Mammals.*

	North America.	Mexico.	Guatemala and Honduras.	Nicaragua.	Costa Rica.	Panama.	South America.
Subclass I. MONODELPHIA.							
Order I. PRIMATES.							
Suborder PLATYRRHINI.							
Fam. I. CEBIDÆ.							
1. Mycetes palliatus, p. 4		..	..	*	*	*	
2. —— villosus, p. 5		..	*				
3. Ateles ater, p. 7		..	..	..	..	*	Peru.
4. —— rufiventris, p. 8		..	..	..	..	*	Colombia.
5. —— geoffroyi, p. 8		..	..	*	*	*	Colombia.
6. —— vellerosus, p. 10		*	*				
7. Cebus hypoleucus, p. 13		..	..	*	*	*	Colombia.
8. Nyctipithecus vociferans, p. 14		..	..	..	*	..	Peru.
9. —— rufipes, p. 15		..	..	*			
10. Chrysothrix œrstedi, p. 16		..	?	?	*	*	
Fam. II. HAPALIDÆ.							
11. Midas geoffroyi, p. 17		..	..	..	..	*	Colombia.
Order II. CHIROPTERA.							
Suborder MICROCHIROPTERA.							
Fam. I. VESPERTILIONIDÆ.							
12. Vesperugo serotinus, p. 20	S. Winnipeg ..	*	*	..	*	..	West Indies.
13. —— propinquus, p. 20		..	*				
14. —— albigularis, p. 21		*					
15. —— parvulus, pp. 21, 203		*	*	..	*		
16. Antrozous pallidus, p. 204	Oregon	*					
17. Nycticejus crepuscularis, p. 204	New York	*					
18. Atalapha noveboracensis, pp. 22, 205	Canada	*	*	..	*	*	Chili.
19. —— intermedia, p. 205	Texas	*					
20. —— cinerea, p. 23	Nova Scotia ..	..	..	..	..	..	Chili.
21. Vespertilio nitidus, p. 24	Washington Ter.	*					
22. —— nigricans, pp. 24, 206		*	*	..	..	..	Brazil.
23. —— subulatus, p. 206	Nova Scotia ..	*					
24. —— albescens, p. 25		*	*	..	..	..	Brazil.
25. —— lucifugus, p. 25	Hudson's Bay ..	..	..	..	..	*	Brazil.
26. Natalus stramineus, p. 26		*	*	..	..	..	Brazil.
Fam. II. EMBALLONURIDÆ.							
27. Rhynchonycteris naso, p. 27		..	*	..	..	..	Brazil.
28. Saccopteryx bilineata, p. 28		..	*	..	..	..	Brazil.
29. —— canina, p. 29		..	*	..	..	..	Brazil.
30. —— plicata, pp. 29, 206		*	..	..	*		
31. Diclidurus albus, pp. 30, 207		..	*	*	..	..	Brazil.

TABLE I. (*continued*).

	North America.	Mexico.	Guatemala and Honduras.	Nicaragua.	Costa Rica.	Panama.	South America.
32. Molossus rufus, p. 31	.....	*	*	..	..	..	Brazil.
33. —— nasutus, p. 32	.....	..	*	..	..	..	Brazil.
34. —— abrasus, p. 32	.....	..	*	..	..	..	Brazil.
35. Nyctinomus gracilis, p. 33	.....	..	*	..	..	*	Brazil.
36. —— brasiliensis, p. 33	California	*	*	..	*	..	Chili.
Fam. III. PHYLLOSTOMIDÆ.							
37. Chilonycteris personata, p. 35	.....	..	*	..	..	..	Brazil.
38. —— rubiginosa, pp. 35, 207	.....	*	*	..	*	..	Brazil.
39. —— davyi, p. 36	.....	*	..	..	..	..	Brazil.
40. Mormops megalophylla, p. 37	.....	*	*	..	..	..	Venezuela.
41. Macrotus waterhousii, pp. 38, 207	California	*	..	..	..	..	West Indies.
42. —— beccurtianus, p. 38	.....	..	*				
43. Vampyrus spectrum, p. 39	.....	..	*	*	*	*	Brazil.
44. —— auritus, p. 40	.....	*	..	..	..	..	Brazil.
45. Schizostoma megalotis, p. 40	.....	*	*	..	..	..	Brazil.
46. Trachyops cirrhosus, p. 41	.....	*	..	..	..	..	Brazil.
47. Phyllostoma hastatum, p. 42	.....	..	..	..	..	*	Brazil.
48. Carollia brevicauda, p. 43	.....	*	..	..	*	*	Brazil.
49. Glossophaga soricina, p. 44	.....	*	*	*	*	*	Brazil.
50. Ischnoglossa nivalis, p. 45	.....	*	*				
51. Glossonycteris lasiopyga, p. 45	.....	*	*	..	..	..	Brazil.
52. Chœronycteris mexicana, pp. 46, 207	.....	*	*				
53. —— minor, p. 207	.....	..	*	..	..	..	Brazil.
54. Artibeus perspicillatus, p. 47	.....	*	*	..	*	..	Brazil.
55. —— cinereus, p. 47	.....	*	*	..	*	..	Brazil.
56. Vampyrops lineatus, p. 48	.....	*	..	..	..	..	Paraguay.
57. —— vittatus, p. 49	.....	..	..	..	*	..	Venezuela.
58. Chiroderma salvini, pp. 49, 207	.....	..	..	..	*	..	Colombia.
59. Sturnira lilium, pp. 50, 208	.....	*	*	..	*	..	Chili.
60. Centurio senex, p. 51	.....	*					
61. —— macmurtrii, p. 51	.....	*	*				
62. Desmodus rufus, p. 52	.....	*	*	..	..	..	Chili.
63. Diphylla ecaudata, p. 53	.....	..	*	..	..	..	Brazil.
Order III. INSECTIVORA.							
Fam. I. SORICIDÆ.							
64. Sorex veræ-pacis, p. 55	.....	..	*				
65. —— euotis, p. 55	.....	*					
66. Blarina micrura, p. 56	.....	..	*	..	*		
67. —— berlandieri, p. 208	.....	*					
68. —— mexicana, p. 57	.....	*					
Order IV. CARNIVORA.							
Suborder FISSIPEDIA.							
Sect. I. ÆLUROIDEA.							
Fam. I. FELIDÆ.							
69. Felis onca, p. 58	Louisiana	*	*	*	*	..	Patagonia.
70. —— pardalis, p. 60	Arkansas	*	*	*	*	*	Patagonia.

TABLE I. (*continued*).

	North America.	Mexico.	Guatemala and Honduras.	Nicaragua.	Costa Rica.	Panama.	South America.
71. Felis tigrina, p. 61	.....	*	*	..	*	*	Paraguay.
72. —— concolor, p. 62	Canada	*	*	..	*		Patagonia.
73. —— yaguarundi, p. 63	.....	*	*	..	*	*	Paraguay.
74. —— eyra, p. 64	.....	*	..	..	*		Paraguay.
75. —— rufa, p. 64	New England..	*					
Sect. II. CYNOIDEA.							
Fam. II. CANIDÆ.							
76. Canis lupus, p. 65	Grinnell Land..	*					
77. —— latrans, p. 66	Kansas	*	*	..	*		
78. Vulpes virginiana, p. 67	New England ..	*	*	..	*		
Sect. III. ARCTOIDEA.							
Fam. III. PROCYONIDÆ.							
79. Procyon cancrivorus, pp. 69, 208 ..	.....	..	..	..	..	*	Guiana.
80. —— lotor, p. 70	Alaska	*	*	..	*		
81. Bassaricyon gabbi, pp. 71, 209	.....	..	..	..	*		
82. Bassaris astuta, p. 72	Oregon	*					
83. —— sumichrasti, p. 73	.....	*	*	..	*		
84. Nasua nasica, p. 74	Texas	*	*	*	*	*	
85. Cercoleptes caudivolvulus, p. 76	.....	*	*	..	*	..	Peru.
Fam. IV. MUSTELIDÆ.							
86. Mustela brasiliensis, p. 78	Oregon?	*	*	..	*	*	Brazil.
87. Galictis barbara, p. 79	.....	*	*	*	*	*	La Plata.
88. Mephitis mephitica, p. 81	Hudson's Bay..	*	*				
89. —— macrura, p. 82	.....	*					
90. —— putorius, p. 82	Iowa	*	*				
91. Conepatus mapurito, p. 84	Texas	*	*	..	*	..	Patagonia?
92. Taxidea americana, p. 85	Hudson's Bay..	*					
93. Lutra felina, p. 86	Alaska?	*	*	..	*	*	Chili.
Fam. V. URSIDÆ.							
94. Ursus horribilis, p. 88	Canada	*					
95. —— americanus, p. 89	Alaska	*					
Suborder PINNIPEDIA.							
Fam. VI. PHOCIDÆ.							
96. Monachus tropicalis, pp. 90, 209....	Florida	*	?	?	..	..	West Indies.
Order V. SIRENIA.							
Fam. I. MANATIDÆ.							
97. Manatus australis, p. 92	Florida	*	*	*	*	..	Brazil.

TABLE I. (*continued*).

	North America.	Mexico.	Guatemala and Honduras.	Nicaragua.	Costa Rica.	Panama.	South America.
Order VI. UNGULATA.							
Suborder PERISSODACTYLA.							
Fam. I. TAPIRIDÆ.							
98. Tapirus bairdi, p. 101	.....	*	*	*	*	*	
99. —— dowi, p. 104	.....	..	*	*	*		
Suborder ARTIODACTYLA.							
Sect. I. SUINA.							
Fam. I. SUIDÆ.							
100. Dicotyles tajacu, p. 107	Arkansas	*	*	..	*	*	Patagonia.
101. —— labiatus, p. 108	.....	..	*	*	*	..	Paraguay.
Sect. II. PECORA.							
Fam. II. BOVIDÆ.							
102. Ovis cervina, p. 111	Yellowstone ..	*					
Fam. III. ANTILOCAPRIDÆ.							
103. Antilocapra americana, p. 112	Canada	*					
Fam. IV. CERVIDÆ.							
104. Cariacus macrotis, p. 114	British Columbia	*					
105. —— virginianus, p. 115	Canada	*	*	*	*	*	Peru?
106. —— toltecus, p. 117	.....	*					
107. —— rufinus, p. 118	.....	*	*	..	*	..	Ecuador.
Order VII. GLIRES.							
Suborder SIMPLICIDENTATA.							
Sect. I. SCIUROMORPHA.							
Fam. I. SCIURIDÆ.							
108. Sciuropterus volucella, p. 121	Labrador	*	*				
109. Sciurus carolinensis, p. 124	New Brunswick.	*	*				
110. —— arizonensis, p. 125	Arizona	*					
111. —— griseoflavus, p. 126	.....	*	*				
112. —— variegatus, p. 127	California	*	*				
113. —— hypopyrrhus, p. 128	.....	*	*	*	*	*	
114. —— variabilis, p. 131	.....	..	..	..	..	*	Bolivia.
115. —— æstuans, p. 132	.....	..	..	*	*	*	Brazil.
116. —— deppei, p. 133	.....	*	*	..	..	..	Colombia.

TABLE I. (*continued*).

	North America.	Mexico.	Guatemala and Honduras.	Nicaragua.	Costa Rica.	Panama.	South America.
117. Sciurus chrysurus, p. 134	.....	..	..	..	..	*	Colombia.
118. Spermophilus annulatus, p. 135	.....	*					
119. —— grammurus, p. 136	Oregon	*					
120. —— spilosomus, p. 137	Texas	*					
121. —— mexicanus, p. 137	Texas	*					
122. Cynomys ludovicianus, p. 138	Montana	*					
Fam. II. CASTORIDÆ.							
123. Castor fiber, p. 139	Hudson's Bay..	*					
Sect. II. MYOMORPHA.							
Fam. III. MURIDÆ.							
124. Mus rattus, p. 141	(Introduced) ..	*					
125. —— alexandrinus, p. 141	,, ..	*	..	..	*	..	(Introduced).
126. —— decumanus, p. 141	,, ..	*	..	..	..	..	,,
127. —— musculus, p. 142	,, ..	*	..	..	..	..	,,
128. Hesperomys teguina, p. 144	.....	..	*	..	*	..	,,
129. —— leucopus, p. 144	Hudson's Bay..	*	*				
130. —— aztecus, p. 145	California	*					
131. —— aureolus, p. 146	South Carolina..	*					
132. —— californicus, p. 146	California	*					
133. —— mexicanus, p. 147	.....	*					
134. —— melanophrys, p. 147	.....	*					
135. —— sumichrasti, p. 148	.....	*					
136. —— palustris, p. 148	New Jersey ..	*	*				
137. —— couesi, p. 149	.....	*					
138. —— nudicaudus, p. 149	.....	..	*				
139. —— panamensis, p. 150	.....	..	*				
140. Ochetodon humilis, p. 151	Iowa	*	..	..	..	*	Colombia.
141. —— mexicanus, p. 151	Louisiana	*					
142. Sigmodon hispidus, p. 152	South Carolina..	*	*				
143. Neotoma floridana, p. 154	New England ..	*	*	..	..	*	
144. —— ferruginea, p. 155	.....	*					
145. Arvicola mexicanus, p. 156	.....	*	*				
146. —— pinetorum, p. 157	New England ..	*					
147. —— quasiater, p. 157	.....	*					
Fam. IV. GEOMYIDÆ.							
148. Geomys mexicanus, p. 159	.....	*					
149. —— hispidus, p. 159	.....	*	*	..	*		
150. Thomomys talpoides, p. 162	Assiniboine Riv.	*					
151. Dipodomys phillipsi, p. 163	Washington Ter.	*					
152. Perognathus flavus, p. 165	Canada	*					
153. —— hispidus, p. 165	.....	*					
154. —— fasciatus, p. 166	Nebraska	*					
155. Heteromys desmarestianus, p. 167	.....	..	*				
156. —— longicaudatus, p. 167	.....	*	*	..	*	*	Venezuela.

TABLE I. (*continued*).

	North America.	Mexico.	Guatemala and Honduras.	Nicaragua.	Costa Rica.	Panama.	South America.
Sect. III. HYSTRICOMORPHA.							
Fam. V. HYSTRICIDÆ.							
157. Synetheres mexicanus, p. 170	.....	*	*	..	*		
Fam. VI. DASYPROCTIDÆ.							
158. Dasyprocta isthmica, p. 171.....	.....	..	..	..	*	*	
159. —— punctata, p. 172	.....	*	*	..	*		
160. —— mexicana, p. 173.....	.....	*					
161. Cœlogenys paca, p. 174	.....	*	*	..	*	*	Paraguay.
Suborder DUPLICIDENTATA.							
Fam. I. LEPORIDÆ.							
162. Lepus sylvaticus, p. 176	Dakota	*					
163. —— graysoni, pp. 177, 211	.....	*	..	..	*		
164. —— gabbi, p. 178	.....	..	..	..	*	*	Colombia.
165. —— callotis, p. 178.....	Oregon	*					
166. —— palustris, p. 179	North Carolina .	*	*				
167. —— aquaticus, p. 180.....	Alabama	*					
Order VIII. EDENTATA.							
Suborder TARDIGRADA.							
Fam. I. BRADYPODIDÆ.							
168. Bradypus infuscatus, p. 183.....	.....	..	..	..	..	*	Brazil.
169. —— castaneiceps, p. 184.....	.....	..	..	*			
170. Cholopus hoffmanni, p. 186	.....	..	..	..	*	*	Ecuador.
Suborder ENTOMOPHAGA.							
Fam. I. DASYPODIDÆ.							
171. Tatusia novemcincta, p. 188	Texas	*	*	*	*	..	Paraguay.
Fam. II. MYRMECOPHAGIDÆ.							
172. Myrmecophaga jubata, p. 191	.....	..	*	..	*	*	Paraguay.
173. —— tetradactyla, p. 192.....	.....	*	*	..	*	..	Paraguay.
174. Cycloturus didactylus, p. 193	.....	..	*	..	*	*	Brazil.
Subclass II. DIDELPHIA.							
Order IX. MARSUPIALIA.							
Fam. I. DIDELPHIDÆ.							
175. Didelphys virginiana, p. 196	New Jersey....	*	*				
176. —— aurita, p. 197	.....	..	..	..	*	..	Uruguay.
177. —— quica, p. 198	.....	*	*	..	*	..	Brazil.
178. —— cinerea, p. 199.....	.....	..	..	..	*	..	Brazil.
179. —— derbiana, p. 199	.....	..	..	*		*	Peru.
180. —— murina, pp. 200, 212	.....	*	*	..	*	*	Brazil.
181. Chironectes variegatus, p. 201.....	.....	..	*	..	*	..	Brazil.

Upon examining this Table it will be found that the 181 species contained in it fall into five different categories, as regards their distribution, namely:—

I. Nearctic Species, *i. e.* Central-American species also found north of Mexico	48
II. Neotropical Species, *i. e.* Central-American species also found south of Panama	65
III. Neogean Species, *i. e.* Central-American species found north of Mexico and also south of Panama	17
IV. Autochthonous Species, *i. e.* species not yet known to occur except in Central America	47
V. Introduced Species (*Mures*)	4
	181

We will now shortly consider each of these categories separately.

I. Nearctic Species.

The species belonging to this section of the Central-American Mammal-fauna have been divided by Alston into four categories, which serve to exhibit very clearly the gradual diminution of the Nearctic forms as we proceed southwards through Central America. These are set out in the subjoined Tables.

Table II.—*Nearctic Species found in the Northern States of Mexico, but not recorded from south of 25° N. lat.*

1. Antrozous pallidus.
2. Nycticejus crepuscularis.
3. Atalapha intermedia.
4. Vespertilio subulatus.
5. Taxidea americana.
6. Ursus horribilis.
7. —— americanus.
8. Ovis cervina.
9. Antilocapra americana.
10. Cariacus macrotis.
11. Spermophilus spilosomus.
12. Cynomys ludovicianus.
13. Castor fiber.
14. Neotoma floridana.
15. Thomomys talpoides.
16. Perognathus flavus.
17. —— fasciatus.

Table III.—*Nearctic Species found in Central and South Mexico, but not recorded from south of the Isthmus of Tehuantepec.*

1. Vespertilio nitidus.
2. Felis rufa.
3. Canis lupus.
4. Bassaris astuta.
5. Sciurus arizonensis.
6. Spermophilus grammurus.
7. —— mexicanus.
8. Hesperomys leucopus.
9. —— aztecus.
10. Heperomys aureolus.
11. —— californicus.
12. —— palustris.
13. Ochetodon humilis.
14. Arvicola pinetorum.
15. Dipodomys phillipsi.
16. Lepus sylvaticus.
17. —— callotis.
18. —— aquaticus.

TABLE IV.—*Nearctic Species extending to Guatemala and Honduras, but not recorded from south of Nicaragua.*

1. Mephitis mephitica.
2. —— putorius.
3. Sciuropterus volucella.
4. Sciurus carolinensis.
5. Sciurus variegatus.
6. Ochetodon mexicanus.
7. Lepus palustris.
8. Didelphys virginiana.

TABLE V.—*Nearctic Species extending to Costa Rica and Panama, but not recorded from south of the Isthmus of Panama.*

1. Canis latrans.
2. Vulpes virginiana.
3. Procyon lotor.
4. Nasua nasica.
5. Sigmodon hispidus.

II. NEOTROPICAL SPECIES.

We will now take a glance at the species belonging to the Central-American Mammal-fauna which may be considered as intruders into it from the opposite direction, *i. e.* from the south. These are 65 in number as against 48 intruders from the north, and by their number at once tend to show the true composition of the Central-American Mammal-fauna. It is perhaps not necessary to give a separate detailed list of them, as they are already indicated in Table I. But it will be seen at a glance that they comprehend members of such genera as *Ateles*, *Cebus*, *Nyctipithecus*, *Midas*, *Chilonycteris*, *Vampyrus*, *Desmodus*, *Diphylla*, *Cercoleptes*, *Cœlogenys*, *Myrmecophaga*, *Cycloturus*, and *Chironectes*, than which there can be no more typical representatives of the Neotropical Mammal-fauna.

III. NEOGEAN SPECIES.

The Central-American Mammals which extend outside the Central-American area in both directions are 17 in number, as set out in the subjoined Table. No very precise conclusions can be drawn, I think, from this category.

TABLE VI.—*Species common to the Nearctic and Neotropical Regions.*

1. Vesperugo serotinus.
2. Atalapha noveboracensis.
3. —— cinerea.
4. Vespertilio lucifugus.
5. Nyctinomus brasiliensis.
6. Macrotus waterhousii.
7. Felis onca.
8. —— pardalis.
9. —— concolor.
10. Mustela brasiliensis.
11. Conepatus mapurito.
12. Lutra felina.
13. Monachus tropicalis.
14. Manatus australis.
15. Dicotyles tajacu.
16. Cariacus virginianus (?).
17. Tatusia novemcincta.

IV. Autochthonous Species.

Having now eliminated the Nearctic and Neotropical elements from the Central-American Mammal-fauna, the remainder (neglecting the four introduced Mures) we shall find to comprehend the indigenous or autochthonous species, as they have been appropriately termed—that is, those that are confined to Central America, or, as it is much safer to say in all such cases, are *not yet known* to occur elsewhere. These are 47 in number, as enumerated in the subjoined Table.

Table VII.—*Species peculiar to Central America, or not yet ascertained to occur elsewhere.*

1. Mycetes palliatus.
2. —— villosus.
3. Ateles vellerosus.
4. Nyctipithecus rufipes.
5. Chrysothrix œrstedi.

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6. Vesperugo propinquus.
7. —— albigularis.
8. —— parvulus.
9. Saccopteryx plicata.
10. Macrotus bocourtianus.
11. Ischnoglossa nivalis.
12. Chœronycteris mexicana.
13. Centurio senex.
14. —— macmurtrii.

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15. Sorex veræ-pacis.
16. —— euotis.
17. Blarina micrura.
18. —— berlandieri.
19. —— mexicana.

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20. Bassaricyon gabbi.
21. Bassaris sumichrasti.
22. Mephitis macrura.

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23. Tapirus bairdi.
24. —— dowi.
25. Cariacus toltecus.

---

26. Sciurus griseoflavus.
27. —— hypopyrrhus.
28. Spermophilus annulatus.
29. Hesperomys teguina.
30. —— mexicanus.
31. —— melanophrys.
32. Hesperomys sumichrasti.
33. —— couesi.
34. —— nudicaudus.
35. Neotoma ferruginea.
36. Arvicola mexicanus.
37. —— quasiater.
38. Geomys mexicanus.
39. —— hispidus.
40. Perognathus hispidus.
41. Heteromys desmarestianus.
42. Synetheres mexicanus.
43. Dasyprocta isthmica.
44. —— punctata.
45. —— mexicana.
46. Lepus graysoni.

---

47. Bradypus castaneiceps.

These 47 autochthonous species belong to the following six orders, according to the nomenclature adopted in the present work :—

I. Primates	5	V. Ungulata	3
II. Chiroptera	9	VI. Glires	21
III. Insectivora	5	VII. Edentata	1
IV. Carnivora	3		

Let us now examine the composition of each of these categories separately, as the study of them must necessarily be of much import on the question of the origin of the Central-American Mammal-fauna.

As regards the Primates, we find that the five peculiar species all belong to well-known Neotropical genera, and in every case have closely allied species in South America.

From the peculiar Chiroptera it is not perhaps so easy to derive such a very decisive conclusion. But casting aside the three *Vesperugines*, as giving little test of locality, we see at once that the remaining six peculiar species are in every case members of Neotropical genera. *Ischnoglossa*, it is true, has not yet been found south of Panama; but it belongs to the purely Neotropical family of Phyllostomatidæ.

On the other hand, when we pass to the Insectivora, the presence of five peculiar Mammals of the Order in Central America is by no means a proof of Neotropical tendencies, the *absence* of Insectivora being one of the cardinal characteristics of the Neotropical Region. It may be remarked, however, that these five little Mammals belong to the two widely diffused genera *Sorex* and *Blarina*, which have nothing specially Palæarctic in their distribution, and that, as will be seen on reference to Table I., but one of these five species is found south of Guatemala.

The three autochthonous Carnivores of Central America belong to three types peculiar to the New World. *Bassaris* is perhaps, as regards its present distribution, rather Nearctic in its tendencies, and *Bassaricyon* rather Neotropical. *Mephitis* is rather a Nearctic form, replaced by *Conepatus* in the south of the American continent.

Of the Ungulates the two Tapirs are essentially Neotropical, or, at any rate, show no connexion with *North* America, while the Deer belongs to a type generally diffused in the New World.

Next, as regards the Rodents, of which universally numerous group no less than 21 Central-American species have not as yet been recorded as existing elsewhere. Of these it may suffice to say that *Spermophilus*, *Neotoma*, and *Arvicola* are decidedly of northern aspect, whilst *Synetheres* and *Dasyprocta* are as surely evidences of southern affinities. The family Geomyidæ, to which four of the remaining species belong, is, it must be acknowledged, rather Nearctic than Neotropical.

Lastly, the single peculiar Edentate belongs to an order characteristic of the Neotropical Region.

But we must not judge the whole character of a fauna solely from its autochthonous

species, although their tendencies must be allowed considerable weight in the balance. Taking the Central-American Mammal-fauna as a whole, I think it may fairly be said that, of the 177 * known constituent species, at least 100 are essentially Neotropical in their character or have Neotropical affinities, while of the remainder not above 60 can be said to be decidedly Nearctic. In the carefully drawn-up list of the Neotropical genera of Mammals which follows, it will be at once manifest that the Neotropical element vastly preponderates in Central America. I have therefore no doubt that the Central-American isthmus, at any rate as far north as the isthmus of Tehuantepec, should be assigned to the Neotropical Region, of which it should be deemed to constitute a distinct province, characterized (1) by the incursion of a considerable number of Nearctic forms, especially in the northern districts, (2) by the presence of a certain number of peculiar species of Neotropical genera, and (3) as being the focus of the families Procyonidæ and Geomyidæ, two well-marked groups of Mammals which have extended themselves alike into the Nearctic and Neotropical Regions.

TABLE VIII.—*Distribution of Neotropical Genera of Mammals.*

		Nearctic Region.	Central America.	Colombia.	Amazons.	South Brazil.	Patagonia.	Antilles.
I. QUADRUMANA.								
I. CEBIDÆ.								
1. Mycetes	1	..	*	*	*	*		
2. Lagothrix	2	..	..	..	*			
3. Ateles	3	..	*	*	*	*		
4. Cebus	4	..	*	*	*	*		
5. Nyctipithecus	5	..	*	*	*	*		
6. Pithecia	6	..	..	..	*			
7. Callithrix	7	..	..	*	*	*		
8. Chrysothrix	8	..	*	*	*			
II. HAPALIDÆ.								
9. Hapale	9	..	..	*	*	*		
10. Midas	10	..	*	*	*	*		
II. CHIROPTERA.								
I. VESPERTILIONIDÆ.								
1. Vesperugo	11	*	*	*	*	*	*	*
2. Atalapha	12	*	*	*	*	*	*	*
3. Vespertilio	13	*	*	*	*	*	*	*
4. Natalus	14	..	*	..	*	..	..	*
5. Thyroptera	15	..	..	..	*			

* *i. e.* excluding the introduced *Mures*.

TABLE VIII. *(continued)*.

		Nearctic Region.	Central America.	Colombia.	Amazons.	South Brazil.	Patagonia.	Antilles.
II. EMBALLONURIDÆ.								
6. Furia	16	..	..	..	*			
7. Amorphochilus	17	..	..	*				
8. Rhynchonycteris	18	..	*	..	*			
9. Saccopteryx	19	..	*	*	*			
10. Diclidurus	20	..	*	..	*			
11. Noctilio	21	..	..	*	*	..	..	*
12. Molossus	22	..	*	*	*	*	..	*
13. Nyctinomus	23	*	*	*	*	..	*	*
III. PHYLLOSTOMIDÆ.								
14. Chilonycteris	24	..	*	*	*	..	..	*
15. Mormops	25	..	*	*	..	..	..	*
16. Lonchorhina	26	..	..	..	..	..	..	*
17. Macrotus	27	*	*	..	..	..	..	*
18. Macrophyllum	28	..	..	..	..	*		
19. Vampyrus	29	..	*	..	*	..	..	*
20. Lophostoma	30	..	..	..	..	*		
21. Schizostoma	31	..	*	*	*			
22. Trachyops	32	..	*	*	*	..	..	*
23. Phylloderma	33	..	..	..	*			
24. Phyllostoma	34	..	*	*	*			
25. Tylostoma	35	..	..	..	*			
26. Mimon	36	..	..	..	*			
27. Carollia	37	..	*	*	*	*	..	*
28. Rhinophylla	38	..	..	..	..	*		
29. Glossophaga	39	..	*	*	*	..	..	*
30. Phyllonycteris	40	..	..	..	..	..	..	*
31. Monophyllus	41	..	..	..	..	..	..	*
32. Ischnoglossa	42	..	*					
33. Lonchoglossa	43	..	..	..	*			
34. Glossonycteris	44	..	*	..	*			
35. Chœronycteris	45	..	*	..	*			
36. Artibeus	46	..	*	*	*	..	..	*
37. Vampyrops	47	..	*	*	*			
38. Stenoderma	48	..	..	..	..	..	..	*
39. Ametrida	49	..	..	..	*			
40. Chiroderma	50	..	*	..	*			
41. Pygoderma	51	..	..	..	*			
42. Sturnira	52	..	*	..	*			
43. Brachyphylla	53	..	..	..	..	..	..	*
44. Centurio	54	..	*					
45. Desmodus	55	..	*	*	*	*	*	
46. Diphylla	56	..	*	..	..	*		
III. INSECTIVORA.								
I. CENTETIDÆ.								
1. Solenodon	57	..	..	..	..	..	..	*

TABLE VIII. (*continued*).

		Nearctic Region.	Central America.	Colombia.	Amazons.	South Brazil.	Patagonia.	Antilles.
II. SORICIDÆ.								
2. Sorex	58	*	*					
3. Blarina	59	*	*					
IV. CARNIVORA.								
I. FELIDÆ.								
1. Felis	60	*	*	*	*	*	*	*
II. CANIDÆ.								
2. Canis	61	*	*	*	*	*	*	*
3. Icticyon	62	..	..	..	..	*		
4. Chrysocyon	63	..	..	..	*	*		
5. Lycalopex	64	..	..	..	*	*		
6. Pseudalopex	65	..	..	..	*	*	*	
7. Thous	66	..	..	..	*	*		
III. PROCYONIDÆ.								
8. Procyon	67	*	*	*	*	*		
9. Bassaris	68	*	*					
10. Bassaricyon	69	..	*	*				
11. Nasua	70	*	*	*	*	*		
12. Cercoleptes	71	..	*	*	*	*		
IV. MUSTELIDÆ.								
13. Mustela	72	*	*	*	*	*		
14. Mephitis	73	*	*					
15. Conepatus	74	..	*	*	*	*	*	
16. Galictis	75	..	*	*	*	*		
17. Lutra	76	*	*	*	*	*	*	
18. Pteronura	77	..	..	..	*			
V. URSIDÆ.								
(Ursus?)	78	*	?					
19. Tremarctos	79	..	..	*				
VI. OTARIIDÆ.								
20. Otaria	80	*	..	*	..	..	*	
21. Arctocephalus	81	..	..	..	..	..	*	
VII. PHOCIDÆ.								
22. Stenorhynchus	82	..	..	..	..	..	*	
23. Morunga	83	*	..	..	..	..	*	
24. Cystophora	84	*	..	..	..	..	..	*
V. CETACEA ‡.								

‡ The Cetaceans cannot be properly considered in treating of a Land-fauna only, as in this case.

TABLE VIII. (*continued*).

		Nearctic Region.	Central America.	Colombia.	Amazons.	South Brazil.	Patagonia.	Antilles.
VI. SIRENIA.								
I. MANATIDÆ.								
1. Manatus	85	*	*	*	*	*	..	*
VII. PERISSODACTYLA.								
I. TAPIRIDÆ.								
1. Tapirus	86	..	*	*	*	*		
VIII. ARTIODACTYLA.								
I. SUIDÆ.								
1. Dicotyles	87	*	*	*	*	*		
II. CAMELIDÆ.								
2. Auchenia	88	..	..	*	..	..	*	
III. CERVIDÆ.								
3. Cariacus	89	*	*	*	*	*		
4. Pudua	90	..	..	..	..	..		
IX. GLIRES.								
I. SCIURIDÆ.								
1. Sciurus	91	*	*	*	*	*		
2. Pteromys	92	*	*					
3. Spermophilus	93	*	*					
II. MURIDÆ.								
4. Mus	94	*	*	*	*	*	*	*
5. Hesperomys	95	*	*	*	*	*	*	*
6. Ochetodon	96	*	*					
7. Reithrodon	97	*						
8. Drymomys	98	..	..	*				
9. Holochilus	99							
10. Sigmodon	100	*	*					
11. Neotoma	101	*	*					
12. Arvicola	102	*	*					
III. GEOMYIDÆ.								
13. Geomys	103	*	*					
14. Dipodomys	104	*	*					
15. Perognathus	105	*	*					
16. Heteromys	106	..	*					

TABLE VIII. (*continued*).

		Nearctic Region.	Central America.	Colombia.	Amazons.	South Brazil.	Patagonia.	Antilles.
IV. OCTODONTIDÆ.								
17. Ctenomys	107	..	...	*	..	*	*	
18. Schizodon	108	..	..	..	..	..	*	
19. Spalacopus	109	..	..	..	..	..	*	
20. Octodon	110	..	..	..	..	..	*	
21. Habrocoma	111	..	..	..	..	..	*	
22. Carterodon	112	..	.	..	*			
23. Myopotamus	113	..	*	*	..	*	*	
24. Cercomys	114							
25. Loncheres	115	..	..	*	*	*		
26. Lasiuromys	116							
27. Mesomys	117	..	..	..	*			
28. Echinomys	118	..	..	..	*	*		
29. Dactylomys	119	..	..	..	*			
30. Plagiodon	120	..	..	..	..	..	..	*
31. Capromys	121	..	..	..	..	..	..	*
V. HYSTRICIDÆ.								
32. Chætomys	122	..	..	..	*			
33. Sphingurus	123	..	*	*	*			
VI. CHINCHILLIDÆ.								
34. Chinchilla	124	..	..	*	..	..	*	
35. Lagidium	125	..	..	*	..	..	*	
36. Lagostomus	126	..	..	..	..	..	*	
VII. DASYPROCTIDÆ.								
37. Dasyprocta	127	..	*	*	*	*	..	*
38. Cœlogenys	128	..	*	*	*	*		
VIII. DINOMYIDÆ.								
39. Dinomys	129	..	..	..	*			
IX. CAVIIDÆ.								
40. Cavia	130	..	..	*	*	*	*	
41. Dolichotis	131	..	..	..	..	..	*	
42. Hydrochœrus	132	..	..	*	*	*		
X. LEPORIDÆ.								
43. Lepus	133	*	*	*	*	*		
X. EDENTATA.								
I. BRADYPODIDÆ.								
1. Cholopus	134	..	*	*	*	*		
2. Bradypus	135	..	*	*	*	*		

TABLE VIII. (*continued*).

		Nearctic Region.	Central America.	Colombia.	Amazons.	South Brazil.	Patagonia.	Antilles.
II. DASYPODIDÆ.								
3. Tatusia	136	*	*	*	*	*		
4. Prionodontes	137	..	..	..	*	*		
5. Dasypus	138	..	..	*	*	*		
6. Xenurus	139	..	..	*	*	*		
7. Tolypeutes	140	..	..	..	..	*	*	
8. Chlamyphorus	141	..	..	..	..	..	*	
III. MYRMECOPHAGIDÆ.								
9. Myrmecophaga	142	..	*	*	*	*		
10. Tamandua	143	..	*	*	*	*		
11. Cycloturus	144	..	*	*	*	*		
XI. MARSUPIALIA.								
I. DIDELPHIDÆ.								
1. Didelphys	145	*	*	*	*	*		
2. Hyracodon (*Tomes*)	146	..	..	*				
3. Chironectes	147	..	*	*	*	*		

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BIOLOGIA CENTRALI-AMERICANA.

ZOOLOGIA.

Class I. MAMMALIA.

Subclass I. MONODELPHIA.

Order I. PRIMATES.

One of the most striking characters of the Mammalian fauna of Central America is the presence of Monkeys, a group which, in the New World, is entirely confined to the Neotropical Region. Both the families, and six out of the ten genera, of American Monkeys are represented within our limits by at least eleven species.

The existence of these animals north of the Isthmus of Panama, though long overlooked by zoologists, was recorded by several of the older voyagers, of whom William Dampier and Lionel Wafer may be specially mentioned. Some of their quaint observations seem worthy of being reproduced; and they may best be given here, as it is not always possible to determine the exact species to which they refer.

Thus Captain Dampier, in his "Two Voyages to *Campeachy*; with a Description of the Coasts, Product, Inhabitants, Logwood-Cutting, Trade, &c. of *Jucatan*, *Campeachy*, *New Spain*, &c." ('Voyages,' vol. ii.: London, 1729), has the following passage (pp. 59, 60):—

"The Monkeys that are in these Parts are the ugliest I ever saw. They are much bigger than a Hare, and have great Tails about two Foot and a half long. The underside of their Tails is all bare, with a black hard Skin; but the upper-side, and all the Body is covered with coarse, long, black, staring Hair. These Creatures keep together 20 or 30 in a Company, and ramble over the Woods; leaping from Tree to Tree. If they meet with a single Person they will threaten to devour him. When I have been alone I have been afraid to shoot them, especially the first Time I met them. They were a great Company dancing from Tree to Tree, over my Head; chattering and making a terrible Noise; and a great many grim Faces, and shewing antick Gestures.

Pr. 1

Some broke down dry Sticks and threw at me; * * * at last one bigger than the rest came to a small Limb just over my Head; and leaping directly at me made me start back; but the Monkey caught hold of the Bough with the tip of his Tail; and there continued swinging to and fro, and making Mouths at me.——At last I past on, they still keeping me Company, with the like menacing Postures, till I came to our Huts. The Tails of these Monkeys are as good to them as one of their Hands; and they will hold as fast by them. If two or more of us were together they would hasten from us. The Females with their young ones are much troubled to leap after the Males; for they have commonly two: one she carries under one of her Arms; the other sits on her Back, and clasps her two Fore-Paws about her Neck. These Monkeys are the most sullen I ever met with; for all the Art we could use would never tame them. It is a hard matter to shoot one of them, so as to take it; for if it gets hold with its Claws or Tail, it will not fall so long as one breath of Life remains. After I have shot at one and broke a Leg or an Arm, I have pitied the poor Creatures to see it look and handle the wounded Limb, and turn it about from side to side. These Monkeys are very rarely, or (as some say) never on the Ground."

In the third volume of the same collection will be found "A New Voyage and Description of the Isthmus of America," by Lionel Wafer, Surgeon, who, being disabled by an accident, was left behind by Dampier's party in May 1681 among the friendly Indians of Darien, with whom he lived for some months. In his account of the wild animals of the Isthmus he says (p. 330):—

"There are great Droves of *Monkeys*, some of them white, but most of them black; some have Beards, others are beardless. They are of a middle Size, yet extraordinary fat at the dry Season, when the Fruits are ripe; and they are very good Meat, for we eat of them very plentifully. The *Indians* were shy of eating them for a while; but they soon were perswaded to it, by seeing us feed on them so heartily. In the rainy Season they have Worms in their Bowels. I have taken a Handful of them out of one Monkey we cut open; and some of them 7 or 8 Foot long. They are a very waggish Kind of Monkey, and plaid a thousand antick Tricks as we march'd at any Time through the Woods, skipping from Bough to Bough, with the young one's hanging at the old one's Back, making Faces at us and chattering. * * * To pass from Top to Top of high Trees, whose Branches are a little too far asunder for their Leaping, they will sometimes hang down by one another's Tails in a Chain; and swinging in that Manner, the lowermost catches hold of a Bough of the other Tree and draws up the rest of them."

Turning to the pages of systematic zoologists, we find, till of late years, only the vaguest and most inaccurate statements as to the distribution and specific identity of the Central-American Monkeys. The first contribution to the subject of any scientific value is contained in a "Note upon the northern limit of the Quadrumana in the New World," published by Mr. Sclater in the 'Natural-History Review' for

1861, in which he showed, principally from the observations of Herr Deppe and M. Sallé, that five genera are represented in Central America, and that *Ateles* extends its range up to the 23rd parallel of north latitude. Eleven years later the same zoologist, in a paper "On the Quadrumana found north of Panama" (P. Z. S. 1872, pp. 2–9), enumerated six genera and ten species, tracing their distribution as far as was then known. This memoir has continued to be our chief authority on the Monkeys of the subregion; and further observation has only rendered it needful to modify it in some details, as will be seen by comparing the table of the distribution of the genera in the Introduction to the present volume with the similar one given by Mr. Sclater in 1872.

Fam. I. CEBIDÆ.

1. MYCETES.

Alouatta, Lacépède, Mém. de l'Inst. Nat. iii. p. 490 (1801)*.
Mycetes, Illiger, Prod. Syst. Mamm. et Av. p. 70 (1811).
Stentor, Ét. Geoffroy, Ann. du Mus. xix. p. 107 (1812).

Among the American Monkeys which have a partially naked prehensile tail, this genus is distinguished by the high pyramidical skull, deep massive mandible, small vertical incisors, well-developed thumbs, and above all by the extraordinary development of the larynx. In this organ the basihyal is much enlarged, and is expanded into a bulla or bony capsule, which is lined by a continuation of the thyroid sac, and forms the instrument by which the Howling Monkey produces the deep-toned and far-reaching shouts from which it derives its name †.

Eight or nine closely allied species of Howlers inhabit South and Central America, from Paraguay in the south to Guatemala in the north, most of them being confined to limited geographical areas. They agree closely in osteological and structural characters, but appear to be constant in their differences in colour. The two species found in our subregion, to which both are peculiar, may be thus characterized:—

1. *M. palliatus*. Hair of flanks elongated, forming a mantle; colour brown-black or black, the long hairs more or less fawn-coloured.
2. *M. villosus*. Hair very long and soft; colour uniform black.

* The new generic names here proposed by Lacépède, in his "Tableau des Divisions &c. des Mammifères" (often quoted as if it were a separate work), have almost all been entirely disused by subsequent writers, although an attempt to revive some of them has been made by Dr. J. H. Slack (Proc. Acad. Philad. 1862). Fortunately they are so imperfectly characterized as to come fairly under Rule XII. of the Stricklandian Code; had it been otherwise, many well-known generic names would have been ousted by such barbarous titles as *Sagouin*, *Aye-Aye*, *Kinkajou*, *Hamster*, &c. &c.

† For a description of this structure see Owen, Anat. of Vert. vol. iii. pp. 598, 599, fig. 471.

1. Mycetes palliatus.

Mycetes palliatus, Gray, P. Z. S. 1848, p. 138, t. vi. (descr. orig.)[1]; Sclater, Nat. Hist. Rev. 1861, p. 509[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 254[3]; Sclater, P. Z. S. 1872, p. 7[4]; Schlegel, Mus. Pays-Bas, vii. p. 152[5].

Congo of Costa-Ricans; *Congo, ó Mono Chillon* of Nicaraguans.

Hab. Nicaragua, shores and islands of Lake Nicaragua (*Sallé*, *Mus. Brit.*[2 4]); Costa Rica, Volcan Barba (*Frantzius & Hoffmann*, *Mus. Berol.*[2 3]), Nicoya (*Arcé*, *Mus. Brit.*); Panama (*Mus. Lugd.*[5]; *Boucard*).

The Mantled Howler was first described and figured by the late Dr. Gray, from specimens which were said to have been sent from Caraccas by M. Sallé[1], but which were really, as Mr. Sclater was informed by the collector himself, from the shores and islands of the Lake of Nicaragua[2 4]. It has since been found in Costa Rica by Hoffmann and Frantzius and by Arcé; and a series of specimens have been received from Panama by the Leyden Museum and by M. Boucard. Mr. Salvin tells me that Captain Dow informed him that he once met with Howling Monkeys on the little island of Hicaron, which lies at the southern extremity of Quibo Island, off the coast of Veragua. The species would probably be *M. palliatus*; but it is difficult to understand how the founders of the colony could have reached this isolated spot from the mainland. South of the Isthmus the Mantled Howler appears to be replaced by the entirely distinct *M. seniculus* (Linn.), the only species known to inhabit Guiana, Venezuela, and Colombia.

This species presents considerable variety in the depth of the black or brown-black ground-colour, and in the extent of the fulvous tints of the flanks and loins. Dr. v. Frantzius states that the Howlers which he saw in Costa Rica were darker than is indicated by Gray's description[3]; and in several of the Panama examples the light markings are much reduced, but in others they are quite as conspicuous as in the Nicaraguan types. This is also the case in Arcé's specimens from Nicoya; and I must therefore agree in Professor Schlegel's conclusion[5] that the variation does not depend on locality.

The habits of the Mantled Howler appear to be quite similar to those of the more southern species, as described by Rengger, Prince Maximilian, and others. According to Dr. v. Frantzius it shows the same preference for the topmost boughs of the trees of the dense primæval forests, and has a similar dull melancholy character, in consequence of which it is seldom kept in confinement. It easily reconciles itself to captivity, however; and a tamed male was observed to howl whenever rain-clouds gathered, and also regularly at five o'clock every morning. The flesh of this species is eaten by the Indians, and is said to be well-flavoured. Señor Lévy observes that in Nicaragua this is the most harmless of the Monkeys, and does no damage to the plantations ('República de Nicaragua,' p. 196).

2. **Mycetes villosus.** (Tab. I.)

Mycetes villosus, Gray, Ann. & Mag. Nat. Hist. xvi. p. 220 (1845, desc. orig.)[1]; Sclater, P. Z. S. 1872, p. 5[2]; Schlegel, Mus. Pays-Bas, vii. p. 151[3].

Mono of Guatemalans.

Hab. GUATEMALA, Vera-Paz (*Salvin & Godman, Mus. Brit.*[2]; *Mus. Lugd.*[3]).

A skin of the Guatemalan Howler, sent home by Messrs. Godman and Salvin, was at first identified at the British Museum with the Black Howler of South Brazil, Bolivia, and Paraguay, *Mycetes caraya* (Humboldt) = *M. niger* (Geoffr.). Mr. Sclater[2] showed that, as might have been expected, it was distinct from that southern form, and identified it with Gray's *M. villosus*[1], a species founded on a single young example in bad condition preserved in the British Museum. This latter is labelled as from "Brazil;" but there seems to be no doubt that this locality is erroneous, and that Mr. Sclater was correct in his identification, which has since been accepted by Professor Schlegel[3]. Unfortunately Messrs. Godman and Salvin's specimen is peculiar in having its frontal hairs directed *downwards* instead of upwards; and Mr. Sclater naturally pointed this out as a distinction from the southern Black Howler*. But Professor Schlegel has clearly shown that this character cannot be depended on, not being found in other individuals from Guatemala, and varying also in other species of *Mycetes*[3]. Better distinctions are to be found in the long soft hair of *M. villosus*, and in the noteworthy fact that the female and young are quite black like the adult male, instead of being pale yellow like the corresponding age and sex of *M. niger*, which latter were formerly supposed to constitute a distinct species, *M. stramineus* (Geoffr.). In this similarity of the sexes the Guatemalan Howler rather resembles the Amazonian species, *M. belzebul* (Linn.), which, however, differs conspicuously in the rufous colour of its hands, feet, and tail.

This Howler is only known to inhabit the eastern and north-eastern portions of Guatemala; and for all that is recorded of its habits and distribution we are indebted to Mr. Salvin, who furnished the following account of it to Mr. Sclater's paper[2]:—

"The *Mycetes* of Guatemala is commonly known as the 'Mono.' It is abundant throughout the virgin forests of the eastern portion of the Republic, but is unknown in the forest-clad slopes which stretch towards the Pacific Ocean. In the former region it is found at various altitudes over a wide expanse of country. I have heard its cry on the shores of the Lake of Yzabal, and seen it at Quirigua in the valley of the River Motagua. All through the denser forests of the valley of the River Polochic it is very common, on the steep mountain-road which lies between the upland village of Purulá and S. Miguel-Tucuru, and especially in the wilderness of uninhabited forest which stretches from Teleman to the Lake of Yzabal. In the unbroken forest-country, which occupies the whole of the northern portion of Vera Paz from Coban and Cahabon to the confines of Peten, it is also abundant; for seldom

* To add to the confusion, Mr. Sclater's cuts of the heads of the two species have been accidentally interchanged, that representing Mr. Salvin's specimen being named *M. caraya*, and *vice versâ*.

an hour passes but the discordant cry of the Mono strikes upon the ear of the traveller as he threads the lonely path to Peten. The elevation of this district varies from about 700 to 3000 feet; and the *Mycetes* is found at all heights. While travelling through this forest in 1862 I was entirely dependent upon my gun for the animal food to supply my party of Indians; and Monos contributed not a little to the larder. The Indians eat Monkey without demur; but the meat looks dark and untempting. For my own part I far preferred the delicate Tinamou or Curassow, a sufficient supply of which never failed for my own consumption. Perhaps there is no district in Vera Paz where Monos are more abundant than the mountains of Chilasco, a cold and damp region, elevated at least 6000 feet above the sea, but where the forest-growth is of the densest description and trees of the largest size abound. It was here that Mr. Godman and I obtained the specimens which are now in the British Museum. The wonderful cry whence *Mycetes* gets its trivial name of Howling Monkey is certainly most striking; and I have sometimes endeavoured to ascertain how far this cry may be heard. It has taken me an hour or more to thread the forest-undergrowth, from the time when the cry first struck my ear to when, guided by the cry alone, I stood under the tree where the animals were. It would certainly not be overestimating the distance to say two miles. When the sound came over the Lake of Yzabal unhindered by trees, a league would be more like the distance at which the Mono's cry may be heard. These animals are found in small companies of five or six. They are usually met with in the upper branches of the highest trees, and, when disturbed, crawl sluggishly along the boughs. The young, as well as the females, are of the same dense black as the old males, but the hair is shorter and less glossy."

The Plate is drawn from one of the above-mentioned specimens now in the British Museum.

2. ATELES.

Sapajou, Lacépède, Mém. de l'Inst. Nat. iii. p. 489 (1801)*.
Ateles, Ét. Geoffroy, Ann. du Mus. vii. p. 260 (1806).

The Spider-Monkeys form a very well-marked group, recognizable at a glance by their short bodies, their greatly elongated limbs and tail, and by their fore paws, in which the thumb is either entirely absent, or (in varieties of two of the species) is represented on one or both hands by an insignificant rudiment.

Much difference of opinion has existed as to the number of species of Spider-Monkeys, which, indeed, form one of the most puzzling groups the zoologist can meet with. All the *Ateles* agree so closely in structure, and some of them vary so greatly in colour, that it is extremely difficult to determine whether certain forms are merely the extremes of a graduated series, or are distinct though closely allied species. After a careful study of all the specimens accessible to me, I recognize four species as natives of

* See footnote to page 3.

Central America, of which two just enter the subregion, and two are peculiar to it. These species may be thus diagnosed:—

1. *A. ater.* Uniform black; face black.
2. *A. rufiventris.* Black; underparts deep rufous.
3. *A. geoffroyi.* Colour varying from deep red-brown to nearly white, *without any definite line of separation* between the colours of the flanks and lower parts.
4. *A. vellerosus.* Black to red-brown above, *sharply defined* from the pale colour of the lower parts.

What relationship these last two forms may have with the *Ateles belzebuth* of Étienne Geoffroy*, which Humboldt identified with the "Marimonda" of the River Orinoco†, must remain for future investigation; for the type of Geoffroy's description cannot now be identified at the Jardin des Plantes, and no authentic specimens of such an *Ateles* from the Orinoco appears to exist in any European museum or menagerie.

With reference, again, to the variation of the different species of this genus, it may still turn out that these so-called varieties are really restricted each one of them to a particular tract of forest in a way that our present rough knowledge of their distribution fails to discriminate; whether this is so or not can only be proved by the comparison of a series of specimens from carefully ascertained localities gathered from all points of the range of the genus. Such an examination may show, on the other hand, that some of the forms which I now regard as distinct grade into one another; and if so my present views would require modification. But until such a series is brought together we have, I think, no choice but to follow the course here adopted with respect to the arrangement of the species.

1. Ateles ater.

Ateles ater, F. Cuvier, Mammif. i. t. 64 (39^{e} liv. 1823, descr. orig.)[1]; Sclater, P. Z. S. 1872, p. 5[2]; Schlegel, Mus. Pays-Bas, vii. p. 170[3].

Hab. Panama, Colon (*Dawes*, *Zool. Soc. Viv.*[2]).—Colombia[2]; Peruvian Amazons[3].

The range of the Black-faced Spider-Monkey extends from Eastern Peru through Colombia to Panama, several living specimens having been sent to the Zoological Society by Mr. J. B. Dawes and others from the latter State. Northwards of the Isthmus it has not yet been traced‡. In Guiana and Brazil it is replaced by the closely allied Red-faced Spider-Monkey, *A. paniscus* (Linn.).

* Ann. du Mus. vii. p. 272, pl. xvi. † Rec. d'Obser. de Zool. i. p. 325.

‡ Nicaragua has been assigned as a locality to some of the Zoological Society's specimens (Rev. List Vert. An., 1877, p. 22); but this proves to have been an accidental error.

2. **Ateles rufiventris.**

Ateles vellerosus (?), Sclater, P. Z. S. 1871, p. 478 (nec Gray)[1].
Ateles rufiventris, Sclater, P. Z. S. 1872, p. 688, t. lvii. (descr. orig.)[2]; Schlegel, Mus. Pays-Bas, vii. p. 182[3].

Hab. Panama (*Mus. Lugd.*[3]).—Colombia (*Mus. Brit.*[1 2]).

A young Spider-Monkey, obtained by an American surveying-party on the River Atrato in Northern Colombia, was purchased alive by the Zoological Society in 1871, and was at first doubtfully assigned to *A. vellerosus*[1]. On its death, however, Mr. Sclater was able to examine it more closely, and decided that it belonged to an undescribed species, for which he proposed the name here adopted[2]; this specimen is now in the British Museum. Since then an adult, "tué en Panama," has been obtained for the Leyden Museum, thus bringing the species within our limits[3].

Nothing further has yet been recorded of this little-known species, which might be regarded as an extreme dark form of *A. geoffroyi* were it not for the clear definition of its two colours. This is even more marked in nature than in Mr. Sclater's plate, in which the rufous of the lower parts is hardly bright enough.

3. **Ateles geoffroyi.**

Ateles geoffroyi, Kuhl, Beitr. z. Zool. p. 26 (1820, descr. orig.)[1]; Schlegel, Mus. Pays-Bas, vii. p. 181[2].
Ateles melanochir, Desmarest, Mamm. p. 76 (1820, descr. orig.)[3]; Sclater, P. Z. S. 1871, p. 226, t. xv.[4]; 1872, p. 4[5]; 1875, p. 419, tt. xlviii., xlix.[6]
Eriodes frontatus, Gray, Ann. & Mag. Nat. Hist. x. p. 256 (1842, descr. orig.)[7]; Zool. Voy. 'Sulphur,' p. 9, t. i.[8]; Sclater, P. Z. S. 1862, p. 186[9]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 258[10].
Ateles ornatus, Gray, Cat. Monkeys &c. Brit. Mus. p. 44 (1870, descr. orig.)[11].
Ateles albifrons, Gray, loc. cit. (descr. orig.)[12].
Ateles hybridus, Gray, tom. cit. p. 43 (descr. orig.)[13]; Sclater, P. Z. S. 1862, p. 186 (nec Geoffr.)[14].
Ateles variegatus, Frantzius, Arch. f. Naturg. xxxv. 1, p. 257 (nec Wagn.)[15].
Mico, Mono Colorado of Costa-Ricans[10].

Hab. Nicaragua, Culebra (*Belcher*, *Mus. Brit.*[8]), S. Juan del Norte (*Manley Wood*, *Mus. Brit.*[13]; *Greey*[14]), Greytown (*Zool. Soc. Viv.*[4]); Costa Rica (*Salvin*, *Mus. Brit.*), Volcan Barba (*Hoffmann*, *Mus. Berol.*[10]), Irazu (*Frantzius*[10]); Panama, Calovevora (*Arcé*, *Mus. Brit.*[5]), Colon (*Zool. Soc. Viv.*).—Colombia (*Zool. Soc. Viv.*)

The paler form of this very variable species was first described by Kuhl[1] and by Desmarest[3], apparently from the same specimen (without locality) in the Paris Museum. Both descriptions bear the same date; but as Desmarest repeatedly refers to the work of the German zoologist, it is evident that the latter's name has priority; and the term *melanochir* having been usually applied to the pale form only, the change does not appear to be inconvenient. A reddish specimen from Nicaragua was separated with

some doubt by the late Dr. Gray as *Eriodes frontatus* [7], but afterwards regarded by him as a variety of *A. melanochir* [11]; and the richly coloured dark type was described by the same voluminous writer as *A. ornatus* [11]. Mr. Sclater and Professor Schlegel have united these nominal species; and a comparison of many specimens leaves little doubt of their identity. Their variation is not connected with geographical distribution, both the dark and the light variety occurring in all the States named above; and every gradation is to be found between the deepest-coloured *ornatus* and the whitest *melanochir*. As already pointed out, the best character by which the darker forms may be distinguished from the next species is the want of a distinct line of demarcation between the colours of the upper and lower parts, the tint of the flanks, whatever it may be, passing almost insensibly into that of the breast and belly in all the varieties.

Geoffroy's Spider-Monkey is a native of Nicaragua, Costa Rica, and Panama; and the Zoological Society have received it from the United States of Colombia. It is very abundant in Costa Rica, according to Dr. v. Frantzius, being found in the mountains up to an elevation of from six to seven thousand feet, as well as in the hot forests near the coast. In Nicaragua, as shown by the above-quoted localities, it is found on both the Pacific and the Atlantic coasts. Northward of this I have not been able to trace it; for the Spider-Monkeys of Guatemala and South Mexico belong, as I believe, to *A. vellerosus*.

In his interesting 'Naturalist in Nicaragua' (p. 117) the late Mr. Belt gave the following account of the habits of this species as observed in that State:—"The large yellowish-brown Spider-Monkey (*Ateles*) roams over the tops of the trees in bands of from ten to twenty. Sometimes they lay quiet till I was passing underneath, when, shaking a branch of the nispera tree [*Achras sapota*], they would send down a shower of the hard round fruit; but fortunately I was never struck by them. As soon as I looked up, they would commence yelping and barking, and putting on the most threatening gestures, breaking off pieces of branches and letting them fall, and shaking off more fruit, but never throwing any thing, simply letting it fall. Often, when on lower trees, they would hang from the branches, two or three together, holding on to each other and to the branch with their fore feet and long tail, while the hind feet hung down, all the time making threatening gestures and cries. Sometimes a female would be seen carrying a young one on its back, to which it clung with legs and tail, the mother making its way along the branches and leaping from tree to tree, apparently but little encumbered with its baby."

Mr. Salvin tells me that during a stay of a few hours at San Juan del Sur, Nicaragua, on the 25th May 1873, he met with several of these Monkeys when strolling in the neighbourhood of the town. He had gone ashore with Captain Dow, and was walking up the course of a half-dry stream, when they came upon a troop of Monkeys which had come to a pool to drink, and were climbing about the low trees on the bank of the

watercourse. Most of the troop consisted of *Cebus hypoleucus*; but with them were several *Ateles*, of one of which Mr. Salvin wrote the following description as it sat jabbering at him and throwing down sticks from a branch about twenty feet above his head:—"The whole body was a light-greyish drab all over, except the hands, knees, elbows, and feet, which were black; the face was black, with the exception of the flesh-coloured mouth; the upper part of the tail was slightly tinged with buff, as was also the top of the head. On the middle of the forehead was a small triangular patch of erect black hairs. There were several others just like the specimen described. These animals were evidently of the form described as *A. melanochir*." It is not unusual, Mr. Salvin informs me, to see Monkeys kept in confinement in the court-yards of the Spanish houses in Guatemala. Amongst them may occasionally be seen individuals of this southern species; but, on inquiry, he has always found that such specimens had been brought either from Nicaragua or Costa Rica.

4. **Ateles vellerosus.**

Ateles frontatus (?), Sclater, Nat. Hist. Rev. 1861, p. 509 (nec Gray)[1].

Ateles vellerosus, Gray, P. Z. S. 1865, p. 733 (descr. orig.)[2]; Cat. Monk. &c. Brit. Mus. p. 44[3]; Sclater, P. Z. S. 1872, pp. 5, 798, pl. ii.[4]; Reinhardt, P. Z. S. 1872, p. 797[5]; Vidensk. Meddelelser, 1872, p. 150[6].

Ateles fuliginosus, Schlegel, Mus. Pays-Bas, iii. p. 179 (nec Kuhl?)[7].

Ateles pan, Schlegel, op. cit. p. 180 (1876, descr. orig.)[8].

Hab. MEXICO, Alvarado (*Deppe*, *Mus. Berol.*[1]), Chiapas, Vera Cruz, San Luis Potosi (*Sallé*[1]), Mirador, Oaxaca (*Liebmann*, *Mus. Hafn.*[5 6]), Acapulco? (*Boucard*[4]); GUATEMALA, Vera Paz[3], Volcan de Atitlan, Pacific Coast (*Salvin*, *Mus. Brit.*), Coban (*Mus. Lugd.*)[7].

The Mexican Spider-Monkey was referred by Mr. Sclater[4] to Gray's *A. vellerosus*, which was originally described from a specimen in the British Museum labelled (certainly erroneously) as being from Brazil[3]; and a comparison of Central-American specimens with Gray's type leaves no doubt as to their identity. Professor Schlegel united both with Kuhl's *A. fuliginosus*[7]; but the description of that species *, though far from diagnostic, seems to me to apply better to the dull grey varieties of *A. geoffroyi*. At the same time Professor Schlegel separated the Spider-Monkeys of Mexico and Guatemala, and gave the name of *A. pan* to the latter[8].

After a careful examination of the specimens in the British, Leyden, Berlin, and Copenhagen Museums, I am convinced that all the *Ateles* hitherto obtained from Mexico and Guatemala are referable to one somewhat variable species, distinct from *A. geoffroyi* though closely allied, for which *A. vellerosus* is the earliest name that can be used with certainty. The most constant character by which they may be separated

* Beitr. z. Zool. &c. p. 25 (1820, descr. orig.).

from the dark *ornatus* form of Geoffroy's Monkey has already been alluded to, namely the sharp definition of the colours of their upper and lower parts. The former varies considerably, being almost uniform dull black in one Vera-Paz specimen, and strongly washed with rufous on the flanks and loins in others from the same province. The extent of the pale colour on the breast and throat, inside of the limbs, and under surface of the tail is most variable both in Mexican and Guatemalan examples; and therefore the distinctions between Professor Schlegel's *A. fuliginosus* and *A. pan* prove to be neither constant nor correlated with geographical distribution.

As shown by the localities quoted above, the Mexican Spider-Monkey is found in Guatemala from coast to coast; for Mr. Sclater was misled by an imperfect skin when he stated that the form found on the Pacific slopes was *A. ornatus* (=*A. geoffroyi*)[4]. Mr. Salvin informs me that when he and Mr. Godman were in Guatemala together they never themselves actually came across any individuals of *Ateles*, though they passed some time in forests frequented by them. A single skin was all they obtained in Vera Paz, though the species is said to be by no means uncommon in the forest country in the northern part of that Department. On the Pacific side Mr. Salvin passed near a troop when riding from Retalhuleu to Huamuchal, but did not actually come up with it; but near the same spot, on the return journey, a collector employed by him secured the specimen now in the British Museum. During his first visit to Guatemala in 1858 Mr. Salvin once came near a troop at the summit of the ridge of mountains which connects the Volcan de Fuego with the main Cordillera. This was at an elevation of about 8300 feet above the sea. Indian hunters always spoke of Monkeys (doubtless of this species) being found in these upland forests.

During Mr. Salvin's last visit to Guatemala (in 1873–74) he met with *Ateles vellerosus* in numbers in the forests of the Volcano of Atitlan. On the 22nd January 1874 he made an expedition from the village of San Agustin, with the object of ascertaining the most practicable part to attempt an ascent of the mountain. On this occasion he ascended to a height of about 6000 feet, and during the last 1000 feet or so met with several troops of *Ateles* in the tops of the higher trees of the forest. One of these, the specimen now in the British Museum, he shot. These parties of Monkeys were usually about twenty in number and of all ages. On approaching them they did not evince any alarm, but kept uttering a constant querulous sort of bark, and moved from time to time so as to get a better view of the intruder. A few days afterwards, during an excursion to the same volcano, when the summit, 11,800 feet above the sea, was reached, numerous troops of *Ateles* were seen in the forest from an elevation of 7000 feet to as low as 2500 feet, on the outskirts of the coffee-plantations of San Agustin. So far as Mr. Salvin could observe with his glass, these Monkeys showed no variation in colour, being dark above and light beneath; but the trees in which they were found were very lofty, and the foliage so dense as to make it difficult to observe them accurately.

In Mexico Professor Reinhardt remarks that this species was obtained by the late Professor Liebmann at Mirador, near the Volcano of Orizaba, in the State of Vera Cruz, where it was common, living in small troops in the deep ravines up to an elevation of 2000 feet. He also found it at a height of 4000 feet in the eastern parts of Oaxaca, but never on the Pacific slope of the Cordillera in that State; and he believed that Monkeys were not to be found on the western coast further north than Tehuantepec [5]. Professor Reinhardt therefore suggests that there may have been some error as to the exact locality of M. Boucard's specimen figured by Mr. Sclater [4], said to be from Acapulco, and that it had probably been brought to that port from the eastern side of the Cordillera.

Deppe's example, now in the Berlin Museum (formerly believed to belong to the last species)[4], was also from Vera Cruz, having been taken alive not far from Alvarado. Lastly, M. Sallé informed Mr. Sclater that the most northern locality for Monkeys with which he was acquainted was in the State of San Luis Potosi, about 23° N. lat., in the upper part of the basin of the Tampico River [1].

3. CEBUS.

Cebus, Erxleben, Syst. Reg. An. p. 44 (1777).

The Capuchins or Sapajous are smaller than the Spider-Monkeys, have more moderately developed limbs, perfect thumbs, and completely haired tails, which are less strongly prehensile than in the genera already treated of. They are also much more active and lively in disposition, and, being easily tamed, they are oftener seen in captivity than any of the other American Monkeys.

The range of the genus extends throughout the greater part of the Neotropical Region, from Paraguay in the south to Nicaragua in the north. A close general resemblance of the species, and a large amount of individual variation, make the Capuchins almost as difficult a genus as *Ateles*, the number of distinct species having been variously estimated at from one to forty. Professor Schlegel, who regards twelve forms as deserving separation, characterizes a small group of the most northern species, which have only five lumbar vertebræ, instead of six, and which agree in their general coloration. Of these the only Central-American form (*C. hypoleucus*) may at once be distinguished from *C. albifrons* (Humb.) by the white of the breast being extended over the shoulders and arms, while the White-headed Sapajou of Guiana, *C. capucinus* (Linn.), is at once separated by its isolated black cap.

1. Cebus hypoleucus.

Simia hypoleuca, Humboldt, Recueil d'Obs. de Zool. i. p. 337 (1811, descr. orig.)[1].

Cebus hypoleucus, Sclater, Nat. Hist. Rev. 1861, p. 509[2]; P. Z. S. 1872, p. 4[3]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 259[4]; Schlegel, Mus. Pays-Bas, vii. p. 190[5].

Mono carablanca of Costa-Ricans.

Hab. Nicaragua, Granada (*Œrstedt, Mus. Hafn.*); Costa Rica (*Arcé, Mus. Brit.*), Volcan Barba (*Hoffmann & Frantzius, Mus. Berol.*[2 4]); Panama (*Mus. Lugd.*[5]; *Arcé, Mus. Brit.*).—Colombia[1].

The White-throated Capuchin, the *Saï à gorge blanche* of Buffon, was first systematically named by Humboldt, who found it in the lowlands of Colombia[1]. Its range does not appear to reach further south, but extends northwards as far as Nicaragua.

Specimens have been received from Panama both by the Leyden Museum and the Zoological Society; and others from Veragua, obtained by Arcé, are in the British Museum. In Costa Rica Dr. v. Frantzius found it not uncommonly in the north-east of the country between the Pacuar and Chirripo, as well as in the mountains of Candalaria and in the neighbourhood of the capital, in the woods known as "la Breña del Padre Hidalgo"[4]. He believed that it did not go further north than the volcanic range; but it is found in Nicaragua, whence Œrstedt sent a specimen to the Copenhagen Museum, and where it was observed by Mr. Belt, who gives the following account of its habits:—"Sometimes, but more rarely [than the *Ateles*] a troop of the White-faced Cebus Monkey would be fallen in with, rapidly running away, throwing themselves from tree to tree. This Monkey also feeds partly on fruit, but is incessantly on the look-out for insects, examining the crevices in trees and withered leaves, seizing the largest beetles, and munching them up with the greatest relish. It is also very fond of eggs and young birds, and must play havoc amongst the nestlings. Probably owing to its carnivorous habits, its flesh is not considered so good by monkey-eaters as that of the fruit-eating Spider-Monkey; but I never myself tried either" ('Naturalist in Nicaragua,' p. 118). A tame one, which Mr. Belt kept for some time, was with difficulty cured of killing ducklings, which it tempted within reach with pieces of bread, and then killed by a bite on the breast. Its voice varied from a gruff bark to a shrill whistle. Dr. v. Frantzius gives a similar account of its carnivorous habits.

As already mentioned, Mr. Salvin tells me that he met with a troop of this species at San Juan del Sur, in Nicaragua, on the 25th May 1873. They were seen in the trees on the margin of a watercourse, whither they had evidently gone to drink from a stagnant pool. On being disturbed they made slowly off through the low trees of the forest of the district. They did not evince much alarm, but evidently thought it best to move out of possible harm's way. With them were several Spider-Monkeys, whose active bolder actions contrasted with the slower and more timid movements of the Capuchins.

4. NYCTIPITHECUS.

Aotus, Humboldt, Illiger's Prod. Syst. Mamm. &c. p. 71 (1811); Rec. d'Obs. de Zool. i. p. 358 (1811)*.
Nyctipithecus, Spix, Sim. et Vespert. Brasil. p. 24 (1823).
Nocthora, F. Cuvier, Mammif. i. t. 79 (43e livr., 1824).

The Douroucoulis, or Night-apes as they have been called, are small Monkeys, remarkable for the enormous size of their eyes, the orbits of which, however, are separated by a perfectly ossified and moderately wide septum. Their middle pair of upper incisors are larger than the rest, their tails are non-prehensile, their fur close and more or less woolly; and their whole appearance is strikingly like that of some of the Lemurs. In habits they are all strictly nocturnal. Four or five species are known, ranging from the northern provinces of the Argentine Republic to Nicaragua. Of these the only two which come within our limits may be known by the following characters:—

1. *N. vociferans.* Ears very short; fur long and woolly; colour greyish brown; middle frontal spot broad.
2. *N. rufipes.* Ears larger (naked?); fur short; colour grey above, shaded with red; lower parts and feet bright rufous; frontal spots narrow and indistinct.

1. Nyctipithecus vociferans.

Nyctipithecus vociferans, Spix, Sim. et Vespert. Bras. p. 25, t. xix. (1823, descr. orig.)[1]; Wagner, Abh. bayer. Ak. v. p. 445[2]; Schlegel, Mus. Pays-Bas, vii. p. 214[3].
Nyctipithecus lemurinus, Is. Geoffroy, Compt. Rend. Ac. Paris, xvi. p. 1151 (1843, descr. orig.)[4]; Arch. du Mus. iv. p. 25, t. ii.[5]; Sclater, P. Z. S. 1872, p. 3[6].
Mico-dormilon of Colombians.

Hab. Costa Rica (*Van Patten*[6]).—Colombia[4 5]; Peruvian Amazons[1 3].

The Woolly Douroucouli of Colombia was described by Isidore Geoffroy as a new species, but was united with *N. vociferans* by Wagner[2], after a comparison of Geoffroy's excellent figure and diagnosis with Spix's type specimens; and his identification has been generally accepted. The range of the species would therefore appear to extend from the Peruvian Amazons, where it was discovered by Spix near Tabatinga[1], through Colombia, where it is found near Santa Fé de Bogotá and in the forests of Quindiú[5], to Costa Rica, whence a specimen was sent home by Dr. van Patten and identified with Geoffroy's species by Mr. Sclater[6]. It is probably a rare animal in Central America; for it escaped the researches of Drs. Hoffmann and v. Frantzius, and has not yet been recorded from Panama or Veragua; and Mr. Salvin thinks that there is even a pos-

* This title has been almost universally disused in consequence of its contradiction to facts, and may be safely rejected under Rule XI. of the Code.

sibility of a mistake having been made in the origin assigned by Dr. van Patten to his example, as the localities given to the specimens obtained by this collector in other branches of zoology have not always been free from doubt.

The habits of this species seem to be very similar to those of *N. trivirgatus*, as described by Humboldt. M. Goudot, who collected Geoffroy's types, tells us that the Mico-dormilons live in small parties or families, which remain concealed in the tops of trees during the day, often hidden in heaps of sticks and dead leaves, which are perhaps collected by themselves. At nightfall they come forth to feed, but seldom seem to wander far, returning regularly to the same places, especially in search of the fruit of the guava. During the darkness they continually utter a low cry, which may be well rendered by the word *douroucou*, dully and feebly pronounced [5].

2. Nyctipithecus rufipes.

Nyctipithecus rufipes, Sclater, P. Z. S. 1872, p. 3, t. i. (descr. orig.)[1].
Nyctipithecus vociferans, var.?, Schlegel, Mus. Pays-Bas, vii. p. 214[2].

Hab. Nicaragua, San Juan del Norte (*Mus. Brit.*)[1].

The still unique type of the Red-footed Douroucouli was received alive from San Juán del Norte by the Zoological Society in June 1871; but it soon died; and its skin and skull are now in the British Museum. Professor Schlegel has referred to it as being possibly a variety of the last species; but, as Mr. Sclater observed in his original description, its affinities seem rather to be with the more southern forms, as *N. trivirgatus*, Humb., and *N. felinus*, Spix (=*N. azaræ*, Humb.). It agrees with these, and differs from *N. vociferans*, in its comparatively slender tail, short fur, and well-developed ears; whether the nakedness of the latter will prove to be an individual peculiarity caused by sickness or not remains to be seen. In the narrowness and indistinctness of the facial markings, the absence of a dorsal streak, and the bright rufous colour of its hands and feet, it appears to be quite distinct from all its congeners.

5. CHRYSOTHRIX.

Chrysothrix, Kaup, Thierreich, i. p. 51 (1835).
Saïmiri, Is. Geoffroy, Résumé d. Leç. de Mammalogie, p. 9 (post 1835) *.
Saimiris, Is. Geoffroy, Compt. Rend. Ac. Paris, xvi. p. 1151 (1843).

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* *Saïmiri*, which has been adopted by some authors, was not used as a generic term by Cuvier in the second edition of the 'Règne Animal' (1829), nor by Voigt in his translation of the same (1831), though both have been credited with it. It was first systematically employed by Geoffroy as quoted above. I have not been able to consult the 'Résumé' (published by M. Gervais); but, as the lectures were delivered in 1835, the name is at best only contemporary with Kaup's better known and more elegant title (*cf.* Geoffroy, Zool. Voy. 'Vénus,' i. pp. 43–45).

In the Tee-tees, Saimiris, or Squirrel-Monkeys, the eyes, although large, are much smaller than in the last genus, and are placed closer together, the interorbital septum being only imperfectly ossified. The skull is remarkable for its elongated form, the occipital region being greatly produced beyond the foramen magnum; and the canine teeth are well developed, instead of being no higher than the molar series, as in the allied genus *Callithrix*. Externally these Monkeys are slender and graceful in form, with long, short-haired, non-prehensile tails; and in habits they are lively, gay, and affectionate, as might be expected from the remarkable volume of their brains.

Four or five species of Tee-tee range from Brazil and Bolivia to Nicaragua and Guatemala. The single Central-American species is recognizable by its bright rufous back and jet-black cap.

1. **Chrysothrix œrstedi.** (Tab. II.)

Saimaris sciurea ?, Sclater, P. Z. S. 1856, p. 139 (nec Linn.)[1].
Chrysothrix sciurea, Sclater, Nat. Hist. Rev. 1861, p. 510[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 260 (nec Linn.)[3].
Saimiris entomophaga, Sclater, P. Z. S. 1872, p. 3 (nec d'Orbigny)[4].
Chrysothrix örstedi, Reinhardt, Vidensk. Meddelelser, 1872, p. 157, t. iii. (descr. orig.)[5]; Günther, Zool. Rec. 1872, p. 8[6].
Saimaris œrstedi, Sclater, P. Z. S. 1873, p. 434[7]; 1874, p. 495[8].
Saïmiri örstedii, Schlegel, Mus. Pays-Bas, vii. p. 245[9].
Titi, Cuistiti, of Costa-Ricans.

Hab. Guatemala, Solola? (*Kelly, Zool. Soc. Viv.*[8]); Costa Rica, Terraba, Piris (*Frantzius*[3]); Panama, Chiriqui (*Bridges*[1]; *Œrsted, Mus. Hafn.*[5]; *Arcé, Mus. Brit.*[4]; *Mus. Lugd.*[9]).

The first record of the existence of a Squirrel-Monkey in Central America was founded on a skeleton brought from Chiriqui by Bridges, which was doubtfully referred by Mr. Sclater to *C. sciurea* (Linn.)[1]. The same name was given by Dr. v. Frantzius to the Tee-tee of Costa Rica[3]; but Mr. Sclater subsequently identified specimens sent by Arcé from Chiriqui, and now in the British Museum, with d'Orbigny's *C. entomophaga*[4], a native of Bolivia and Peru. Professor Reinhardt, however, regarded the Central-American animal as distinct, and named it after the well-known Danish traveller Œrsted, who had brought an example from the State of Panama as far back as 1849[5]. An examination of a considerable series of specimens tends to prove that Dr. Reinhardt is correct. It is true that, as Dr. Günther has observed[6], there is a great variety in the darkness of the cap in the Peruvian species; but I have not yet seen any which showed any approach to the rich red colouring of the upper parts which is characteristic of *C. œrstedi*. It is to be observed, also, that there is a wide gap between the known ranges of the two forms, neither having hitherto been recorded from Colombia, where *C. sciurea* appears to take their place.

An example of the Red-backed Tee-tee, in the British Museum, was obtained during the survey of the Pacific coast by Captain Kellet and Lieutenant Wood; but the locality has not been noted. The species appears to be not uncommon in Veragua; but in Costa Rica Dr. v. Frantzius says it is confined to the hotter region, being particularly abundant in the valley of Terraba and on the plain of Piris[3]. He believed its northern limit to be defined by the seaward-running spurs of the Herradura Mountains. But this may be an error; for in 1874 a living example was presented to the Zoological Society by Mr. W. F. Kelly, who informed Mr. Sclater that it was obtained in the Department of Solola, Guatemala[8]. It is quite possible, however, that this specimen had previously been imported into Guatemala from a more southern country, and I think that this northern habitat requires further confirmation.

Fam. II. HAPALIDÆ.

1. MIDAS.

Midas, Et. Geoffroy, Ann. du Mus. xix. p. 120 (1812).

All the species of Marmosets or Tamarins, constituting the genera *Hapale* and *Midas*, agree in their more important characters, and differ not only from the Cebidæ, but from all other Monkeys, in having an unconvoluted brain, only two true molars above and below on each side, and curved compressed claws on all their digits, except the hallux, the nail of which is flat. Those species which have the lower canines much longer than the lower incisors have been separated from *Hapale* under the name of *Midas*; and although a tendency is shown by some species to grade from one type to the other, yet the division may be conveniently retained in dealing with such a vast variety of allied forms as are here presented to us. Of these, however, only a single species has yet been found north of the isthmus*, easily separable from its nearest ally, *M. œdipus* (Linn.), by its rufous nape and by the absence of an elongated white occipital crest.

1. Midas geoffroyi.

Hapale œdipus, Sclater, Nat. Hist. Rev. 1861, p. 509 (nec Linn.)[1].
Hapale geoffroyi, Pucheran, Rev. Zool. viii. p. 336 (1845, descr. orig.)[2]; Schlegel, Mus. Pays-Bas, vii. p. 258[3].
Midas geoffroyi, Sclater, P. Z. S. 1871, p. 478, t. xxxviii.[4]; 1872, p. 2[5].

Hab. Panama (*Courtine, Mus. Paris.*[2]; *Boucard, Mus. Berol.*), Chiriqui (*Zool. Soc. Viv.*[1]), Colon (*ib.*[4]), Chepo (*Arcé, Mus. Brit.*; *Mus. Lugd.*[3 5]).—Colombia[4].

* *Iacchus rufiventer*, Gray, described as from Mexico (Ann. & Mag. Nat. Hist. 1843, xii. p. 398), is really a Brazilian species, and is identified by Professor Schlegel with *M. labiatus*, Ét. Geoff.

Geoffroy's Marmoset, originally described from Panama, seems to be the only species found there; for Mr. Sclater believes that the specimens formerly referred by him to *M. œdipus* (Linn.)[1] were probably of this species[5]. Several examples have been received alive from that State by the Zoological Society; and many specimens have been sent to the European museums by Arcé and other collectors. It has not yet been met with further north; but to the southward its range extends some way into Colombia, where specimens, presented by Mr. W. Benchley to the Zoological Society, were obtained in the forests near the coast[4]; but the common Marmoset of that country is certainly the Pinche, *M. œdipus*.

The habits of Geoffroy's Marmoset are probably similar to those of its congeners, but no special observations on this point appear to have been recorded.

Order II. CHIROPTERA.

The Chiropterous fauna of Central America is characterized by the enormous preponderance of the typically Neotropical family Phyllostomidæ, which claims nineteen out of the twenty-eight genera which will here be recognized; and only one of these (*Macrotus*) extends a short way into the Nearctic Region. Of the Emballonuridæ, which has a similar distribution in the New World, we have five genera, of which *Nyctinomus* alone is found in North America. The cosmopolitan family Vespertilionidæ, on the other hand, is poorly represented by four genera; and though most of the species are of northern types, yet several of them also range far to the southward. It will be seen, therefore, that the Neotropical character of the Central-American fauna is almost as well shown here as in the last order. The range of the species, however, is much more extensive, only ten species being peculiar to the subregion, while thirty-two extend as far south as Brazil.

No order of Mammalia, except perhaps the Cetacea, requires such an extensive special knowledge and practical experience in the discrimination of species and weighing of affinities as does the Chiroptera. I have therefore had to avail myself very largely of the labours of Professor W. Peters and of Mr. G. E. Dobson, who have done so much of late years to clear up the confusion in which the order was involved. I have to acknowledge valuable assistance from both these gentlemen: my thanks are especially due to Mr. Dobson for much kindly criticism; and Professor Peters has not only furnished me with a list of the Central-American Bats in the Berlin Museum, but has enabled me to figure some of the species which are still unrepresented in our own collections. To Professor F. Spencer Baird I am indebted for a full list of the specimens in the United-States National Museum at Washington.

Fam. I. VESPERTILIONIDÆ.

1. VESPERUGO.

Vesperugo, Keyserling u. Blasius, Arch. f. Naturg. v. i. p. 312 (1839).
Scotophilus auctt. (nec Leach)*.

The members of the widely distributed family Vespertilionidæ are characterized by their widely separated intermaxillaries, simple nostrils, and well-developed tragus, combined with a lengthened tail which reaches to the margin of the interfemoral membrane. Of the four genera represented in the Central-American fauna, the first, *Vesperugo*, may be recognized by the broad flattened head, by the short subtriangular ear of which the outer margin has its origin near the angle of the mouth, by the small inward-curved tragus, the short legs, and usually by the presence of a small posterior lobe attached to the calcaneum.

The range of *Vesperugo* is co-extensive with that of the family, including all the zoographical regions and most of the subregions. The species are both very numerous and often very variable in their characters; for "specimens of the same species, even from the same locality," says Mr. Dobson, "occasionally present differences which lead to their being regarded as distinct species." The Bats of this genus, and, indeed, of the whole family, are consequently very difficult to diagnose, especially in a few words; but the four Central-American species may be distinguished by the following characters:—

1. *V. serotinus.* Incisors $\frac{2\cdot2}{6}$. Tragus broadest below the middle of its outer margin; last two caudal vertebræ free. Forearm 2″·15. Fur varying from dull brown to brownish-buff, paler beneath.
2. *V. propinquus.* Incisors $\frac{2\cdot2}{6}$. Tragus broadest about the middle of its outer margin; ear-conch thickened at its inner edge. Forearm 1″·60. Fur rufous above, paler beneath.
3. *V. albigularis.* Incisors $\frac{2\cdot2}{6}$. Outer margin of ear-conch rising under the jaw and separated from angle of mouth by a wart. Forearm 1″·69. Fur dark brown; chin, throat, and posterior margin of membrane white.
4. *V. parvulus.* Incisors $\frac{1\cdot1}{6}$. Tragus long, pointed; postcalcaneal lobe well developed. Forearm 1″·15. Fur brownish-yellow, paler beneath.

* The type of *Scotophilus* of Leach (Trans. Linn. Soc. xiii. 1822, p. 71) was an immature Bat in the British Museum, probably identical with *Nycticejus temmincki*, Horsfield; and his name has been very properly restricted by Professor Peters and Mr. Dobson to the Old-World species formerly included in the genus *Nycticejus* (cf. Monatsb. Ak. Berl. 1866, p. 679; P. Z. S. 1875, p. 368).

1. Vesperugo serotinus.

Vespertilio serotinus, Schreber, Säugth. i. p. 167, t. liii. (1775, ex Buffon)[1].
Vespertilio fuscus, Beauvois, Cat. Peale's Mus. p. 14[2] (1796, descr. orig.; fide H. Allen, Mon. Bats N. Am. p. 31[3]).
Vespertilio ursinus, Temminck, Mon. de Mamm. ii. p. 235 (1835–41, descr. orig.)[4].
Scotophilus ursinus, Tomes, P. Z. S. 1861, p. 278[5].
Vesperus fuscus, Frantzius, Arch. f. Naturg. xxxv. i. p. 264[6].
Vesperugo serotinus, Dobson, Cat. Chir. Brit. Mus. p. 191[7].

Hab. Palæarctic, Oriental, Ethiopian, and Nearctic Regions[7].—Mexico (*Salle*)[5]; Guatemala, Dueñas (*Salvin, Mus. Brit.*[5 7]; *Mus. Berol.*); Costa Rica (*Hoffman & Frantzius, Mus. Berol.*[6]; *Rogers, Mus. Brit.*).—West Indies[7].

Until lately the "Brown Bat" of North America has been regarded as a distinct species under the names of *V. fuscus* or *V. ursinus*, and has been considered to differ constantly from the well-known Serotine of the Old World in size, in colour, and in the amount of emargination of the outer margin of the ear-conch. But Mr. Dobson found that individuals collected by Mr. Salvin in Guatemala were absolutely undistinguishable from European examples. He was therefore led to make a careful examination of specimens of *V. fuscus* from various parts of America, and came to the conclusion that the Transatlantic form could at most be regarded as a variety only of *V. serotinus*. The known range of this widely distributed Bat is therefore greatly extended, and now includes all the zoographical regions with the sole exception of the Australasian[7].

In North America the Serotine is found throughout the temperate and warmer regions. Its southward range extends throughout Central America, at least as far as Costa Rica, where Dr. v. Frantzius says it is not rare[6], and whence Messrs. Godman and Salvin have received specimens now in the British Museum. It has not yet been recorded from Panama, nor from any part of the South-American continent, although it is common in some of the West-Indian islands[7].

2. Vesperugo propinquus.

Vesperus propinquus, Peters, Monatsb. Ak. Berl. 1872, p. 262 (descr. orig.)[1].
Vesperugo propinquus, Dobson, Cat. Chir. Brit. Mus. p. 203[2].

Hab. Guatemala, Yzabal (*Sivers, Mus. Berol.*[1]).

This species is very nearly allied to the Northern Bat of Europe, *V. borealis* (Nilsson), from which it is distinguished by Professor Peters by the different form of the ear-conch and by the dentition, the outer upper incisors being smaller than the inner in cross section at the base, and the lower incisors placed in a regular series parallel to the line

of the mandible. The only specimens yet known are the types, an adult and a young example, collected by Herr J. Sivers at Yzabal de Guatemala, and preserved in the Berlin Museum [1].

3. **Vesperugo albigularis.** (Tab. III. fig. 1.)

Vesperus (*Marsipolæmus*) *albigularis*, Peters, Monatsb. Ak. Berl. 1872, p. 260 (descr. orig.) [1].
Vesperugo albigularis, Dobson, Cat. Chir. Brit. Mus. p. 207 [2].

Hab. Mexico (*Mus. Berol.* [1]).

This curiously-coloured Bat differs from the rest of the genus in the manner in which the lower extremity of the outer margin of the ear-conch is produced forwards so as to form a sort of shallow pouch below the angle of the mouth; and Professor Peters has consequently instituted the subgenus *Marsipolæmus* for its reception. Mr. Dobson considers it as indicating an approach to the genus *Chalinolobus* [2]. The only specimen yet recognized is the type in the Berlin Museum, an apparently adult male, stated to be from Mexico, but of which the exact locality has not been received; and I am indebted to the kindness of Professor Peters for the drawing from which our figure is taken.

4. **Vesperugo parvulus.** (Tab. III. fig. 2.)

Rhogoësa parvula, H. Allen, Proc. Acad. Philad. 1866, p. 285 (descr. orig.) [1].
Rhogoësa tumida, H. Allen, tom. cit. p. 286 (descr. orig.) [2].
Vesperugo parvulus, Dobson, Cat. Chir. Brit. Mus. p. 245 [3].

Hab. Mexico, Tres Marias (*Grayson, U.S. Nat. Mus.*[1]), Mirador (*Sartorius, U.S. Nat. Mus.*[2]); Honduras (*Dyson, Brit. Mus.*[3]); Guatemala, Vera Paz (*Mus. Berol.*); Costa Rica (*Mus. Brit.*[3]).

This species differs from the rest of its congeners in having only two upper incisors and two upper premolars; and Dr. H. Allen, recognizing two closely allied species, made them the types of a new genus, *Rhogoësa*, which he regarded as allied to the Noctilionidæ [1 2]. Mr. Dobson, however, remarks that "although this species has the dental formula of *Nycticejus*, it, in all other respects, evidently belongs to the genus *Vesperugo*. This is especially shown by the notched upper incisors, the form of the ear and tragus, and the distinct postcalcaneal lobe." He adds that he has little doubt of the identity of the two species described by Dr. Allen, *R. tumida* being evidently described from a more full-grown specimen than the types of *R. parvula* [3].

Our figure is from one of the Costa-Rican specimens in the British Museum, which also contains examples collected in Honduras by Mr. Dyson; others from Guatemala are preserved in the Berlin Museum.

2. ATALAPHA.

Atalapha, Rafinesque, Précis des Découvertes &c. p. 12 (1814); fide Desmarest, Mamm. p. 146 (1820).

Lasiurus, Rafinesque, fide Gray, List Mamm. Brit. Mus. p. 32 (1843).

In this genus, which is closely allied to the last, the premaxillaries are very narrow, and in the adult there are only two upper incisors, which are placed close to the canines. The outer margin of the ear-conch is strongly angular, the tragus is curved inwards, and either the whole, or at least the greater part, of the upper surface of the interfemoral membrane is thickly clad with fur.

Several species are distributed over the greater part of the Nearctic and Neotropical Regions, two of which are almost certainly members of our fauna, though one only has hitherto been found within our limits. These two species may be characterized as follows:—

1. *A. noveboracensis.* Premolars $\frac{2 \cdot 2}{2 \cdot 2}$. Forearm naked, 1″·50. Fur yellowish-red; a white mark on each shoulder.
2. *A. cinerea.* Premolars $\frac{2 \cdot 2}{2 \cdot 2}$. Forearm with a hairy patch near the elbow, 2″·10. Fur brown, tipped with white.

Of the other established species, *A. intermedia* (Allen), with olive-brown fur and only two upper premolars, is a native of Texas and Northern Mexico, but does not appear to have been traced further south than Matamoras, whence there is a specimen in the Berlin Museum.

1. **Atalapha noveboracensis.**

Vespertilio noveboracensis, Erxleben, Syst. Regn. An. p. 155 (1777, ex Pennant)[1].

Vespertilio lasiurus, Schreber, Säugth. i. t. lxii. B (1792)[2]*.

Vespertilio tessellatus, Rafinesque, Am. Monthly Mag. iv. p. 445 (1817, descr. orig.)[3].

Nyctecæus tessellatus, Dugès, La Nat. i. p. 137[4].

Atalapha noveboracensis, Frantzius, Arch. f. Naturg. xxxv. i. p. 264[5]; Dobson, Cat. Chir. Brit. Mus. p. 269[6].

Atalapha frantzii, Peters, Monatsb. Ak. Berl. 1870, p. 908 (descr. orig.)[7].

Hab. North America (from Canada[6]).—Mexico (*Mus. Berol.*), Guanajuato (*Dugès*[4]); Guatemala, Dueñas (*Salvin, Mus. Brit.*[6]); Costa Rica (*Frantzius, Mus. Berol.*[5]); Panama, Colobre (*Salvin, Mus. Berol.*).—West Indies[6]; Peru[6]; Chili[6]; Brazil[6].

The "Red Bat," as it is usually called in the United States, appears to have a very

* The date of Schreber's "erster Theil" is 1775; but the name *lasiurus* only appears on t. lxx. B, which was issued in 1792 with the "vierter Theil" (cf. tom. cit. p. 936).

wide range, extending over a great portion of North and South America; for I follow Mr. Dobson in regarding the various Neotropical forms as not being specifically distinct. The Central-American race (named *A. frantzii* by Professor Peters, in honour of Dr. v. Frantzius [7]) only differs from typical *A. noveboracensis* in the ears and tragus being slightly smaller, in the fur being shorter behind the forearm and not extending quite to the edge of the interfemoral membrane, and in the rufous colour being brighter. These differences seem to be the natural effect of a tropical climate; and even in the United States Dr. H. Allen observes that specimens from the warmer parts of the country are of a brighter red than those from the more northern States. This variety has also been recorded from Brazil and Chili, while other Neotropical forms have been separated as *A. pfeifferi*, Gundlach, and *A. varia* (Pœppig).

2. **Atalapha cinerea.**

Vespertilio cinereus, Beauvois, Cat. Peale's Mus. p. 14 [1] (1796, descr. orig.; fide H. Allen, Mon. Bats N. Am. p. 21) [2].

Vespertilio pruinosus, Say, Long's Exped. p. 67 (1823, descr. orig.) [3].

Lasiurus grayi, Tomes, P. Z. S. 1857, p. 40 (descr. orig.) [4].

Atalapha cinerea, Peters, Monatsb. Ak. Berl. 1870, p. 910 [5]; Dobson, Cat. Chir. Brit. Mus. p. 272, t. xvi. figs. 1, 2 [6].

Hab. North America, from Nova Scotia.—South America, to Chili.

Mr. Dobson remarks that the Neotropical form separated as *Lasiurus grayi* only differs from the typical Nearctic *Atalapha cinerea* in being slightly smaller, in having the inner edge of the ear-conch somewhat less convex, and in the colour of the fur being more rufous [6]. Regarding these differences as of less than specific value, the range of *A. cinerea* would appear to be very much that of the last species, in which we have seen an exactly similar variety in coloration in the northern and southern races. There can therefore be little doubt that the species must exist in Central America, although I cannot find that it is represented in any of the collections hitherto sent to Europe.

3. VESPERTILIO.

Vespertilio, Linnæus, Syst. Nat. i. p. 46 (1766) [as restricted by Keyserling and Blasius, Arch. f. Naturg. v. 1, p. 306 (1839)].

The Bats of the typical genus *Vespertilio* differ from those already described in having three pairs of upper premolars. Their ears are long and narrow, with the outer margin rising, not near the angle of the mouth, as in *Vesperugo* and *Atalapha*, but nearly in a line with the base of the tragus. The latter is long, narrow, and

straight, or curved outwards; the muzzle is considerably produced, and the crown of the head raised, the cranium being vaulted above the level of the facial bones.

The genus *Vespertilio* is nearly as cosmopolitan as *Vesperugo*, though its range does not extend quite so far towards the extreme north; and the species, which are all more or less slight and delicate in general structure, are very numerous. The four which have been recorded as members of our fauna may be thus distinguished:—

1. *V. nitidus.* Ear as long as the head; muzzle slender, pointed; thumb shorter than the foot, which is small; tail wholly included in the membrane. Forearm 1″·20. Fur reddish-brown above, reddish-grey below.
2. *V. nigricans.* Ear shorter than the head; muzzle obtuse; thumb as long as the foot. Forearm 1″·30. Fur sooty rust-colour.
3. *V. albescens.* Ear when laid forward not reaching to the end of the muzzle. Forearm 1″·75. Fur grizzled blackish-brown above, belly greyish-white.
4. *V. lucifugus.* Ear when laid forward reaching to the end of the muzzle. Forearm 1″·40. Fur olive-brown, greyish below.

1. Vespertilio nitidus.

Vespertilio nitidus, H. Allen, Proc. Ac. Philad. 1862, p. 247 (descr. orig.)[1]; Mon. Bats N. Am. p. 60[2]; Dobson, Cat. Chir. Brit. Mus. p. 318, t. xix. fig. 7[3].

Hab. North America (west of Rocky Mountains[2]).—Mexico, San Juan (*Mus. Brit.*)[3].

This species, as observed by its describer, is closely allied to the Whiskered Bat of Europe and Asia, *V. mystacinus*, Leisler, from which it differs in its much smaller thumb, shorter tail, and longer calcaneum, as well as in colour. The range of *Vespertilio nitidus* appears to be confined to the Pacific slopes of the North-American continent, from Washington Territory southwards. It has been obtained in Arizona, California, New Mexico, and Texas[2]; and there is a Mexican specimen in the British Museum which is labelled as being from "San Juan;" but, as there are several places of that name, the southward range of the species remains uncertain.

2. Vespertilio nigricans.

Vespertilio nigricans, Max. zu Wied, Schinz's Thierreich, i. p. 179 (1821, descr. orig.)[1]; Beitr. Nat. Bras. ii. p. 266[2]; Dobson, Cat. Chir. Brit. Mus. p. 319, t. xix. fig. 9[3].

Vespertilio parvulus, Temminck, Mon. de Mamm. ii. p. 246 (1835–41, descr. orig.)[4].

Hab. Mexico, City of Mexico (*Boucard, Mus. Berol.*); Guatemala, Dueñas (*Salvin, Mus. Brit.*[3]; *et Mus. Berol.*).—Colombia[4]; Ecuador[3]; West Indies[3]; Brazil[1 4].

This Bat was first found in Brazil, and was described both by Prince Wied[1] and by Temminck[4]; but their nominal species have been reunited by Mr. Dobson

after a comparison of their types [3]. The range of *V. nigricans* appears to extend over the greater part of the northern portion of the South-American continent; it reaches the West Indies, and is found in Central America as far north as the City of Mexico, whence there is an example in the Berlin Museum.

3. Vespertilio albescens.

Vespertilio albescens, Et. Geoffroy, Ann. du Mus. viii. p. 204 (1806, descr. orig.)[1]; Peters, Monatsb. Ak. Berl. 1866, p. 19[2]; Dobson, Cat. Chir. Brit. Mus. p. 326, t. xix. fig. 8[3].

Vespertilio leucogaster, Max. zu Wied, Schinz's Thierr. i. p. 80 (1821, descr. orig.)[4]; Beitr. Nat. Bras. ii. p. 271[5]; Abbild. t. xxi.[6]

Hab. Mexico, Tehuantepec (*Boucard, Mus. Brit.*[3]); Guatemala, Ciudad Vieja (*Salvin, Mus. Brit.*[3]).—Ecuador[3]; Brazil[4].

The strictly Neotropical species *V. albescens* is found throughout Central America, going as far north as Mexico. Besides the characters already mentioned (p. 24), Mr. Dobson remarks that this species "is distinguished especially by its peculiarly thick, not broad muzzle, by the great length of the forearm in comparison to the length of the body, and (in fully adult specimens) by the narrow space between the canines and third premolar, and consequent displacement inwards of both the first and second minute upper premolars"[3]. Mr. Salvin's specimens were brought to him by Indians, who said they had caught them in a cave.

4. Vespertilio lucifugus.

Vespertilio lucifugus, Leconte, M'Murtrie's ed. Cuvier's An. Kingd. i. App. p. 431 (1831, descr. orig.)[1]; H. Allen, Mon. Bats N. Am. p. 55[2]; Dobson, Cat. Chir. Brit. Mus. p. 328, t. xix. fig. 11[3].

Hab. North America (from Hudson's Bay[2]).—Panama, Aspinwall (*Hayes, U.S. Nat. Mus.*[2]).—West Indies[3]; Brazil[3].

This is another wide-ranging species; for there are specimens from Lake Winnipeg and from the interior of Brazil in the British Museum[3]. It is doubtless a native of most of the Central-American states, though the only recorded specimen from within our limits appears to be one sent from Aspinwall to the United-States National Museum by the late Dr. S. Hayes[2].

4. NATALUS.

Natalus, Gray, Mag. Zool. & Bot. ii. p. 496 (1833).

In the small Neotropical genus *Natalus* the upper incisors, four in number, are placed in pairs, each couple being separated from the canine as well as from the other pair;

and there are three premolars both above and below. The face is concave, with the crown of the head arched above it; and the bases of the thumbs and soles of the feet are simple—that is, they are not provided with the remarkable suctorial disks which characterize the nearly-allied Brazilian genus *Thyroptera*. The range of the two well-established species extends from Mexico to Brazil, one being confined to the mainland, while the other, *N. lepidus* (Gervais), is a native of the island of Cuba. Of these the continental form is distinguishable by its much larger size (the forearm measuring about an inch and a half), and by the form of the tragus, which tapers from a broad base and is sharply pointed, whereas in *N. lepidus* it is narrow beneath and expanded above.

1. Natalus stramineus.

Natalus stramineus, Gray, Mag. Zool. & Bot. ii. p. 496 (1838, descr. orig.)[1]; Tomes, P. Z. S. 1856, p. 178, t. xliii.[2]

Natalus stramineus, var. *α*, Dobson, Cat. Chir. Brit. Mus. p. 343, t. xvii. fig. 8[3].

Hab. Mexico[2], Mirador (*U.S. Nat. Mus.*); Guatemala, Dueñas (*Salvin, Mus. Brit.*[3]).—Brazil[3].

The range of this species appears to extend from Brazil to Southern Mexico. Of the Guatemalan specimen in the British Museum, Mr. Dobson remarks that "the ears are smaller and less pointed, the muzzle narrower, and the wings attached to the tibiæ higher up than in the typical example of *N. stramineus*. The wing-membrane becomes adherent to the under surface of the tibia at the commencement of its distal third, and a band then extends across a much wider angle to the calcaneum; the colour of the fur is also much darker, being dark reddish-brown above, slightly paler beneath, the extreme tips of the hairs somewhat ashy. The measurements are also different * * * *; but in the absence of other specimens, I hesitate to describe it as the type of a distinct species."

Fam. II. EMBALLONURIDÆ.

1. RHYNCHONYCTERIS.

Proboscidea, Spix, Sim. et Vesp. Bras. p. 61 (1823, nec Bruguière, 1791).
Rhinchonycteris, Peters, Monatsb. Ak. Berl. 1867, p. 477.

The second family of Chiroptera represented in our fauna, the Emballonuridæ, has a wide distribution throughout the warmer countries of both hemispheres, and in the New World is almost confined to the Neotropic Region. As defined by Mr. Dobson, the family is characterized by the combination of a tail which either perforates the

interfemoral membrane and lies free on its upper surface, or is considerably produced beyond its posterior margin, with simple nostrils, devoid of any leaf-like appendages.

The first genus, according to the arrangement here adopted, is the very peculiar-looking form named *Proboscidea* by Spix; but that name having been long preoccupied in zoology, Professor Peters has substituted *Rhynchonycteris*. In this Bat the muzzle is produced into a long slender snout, reaching far beyond the opening of the mouth; the ears are very narrow and much tapered, and the intermaxillaries are ossified. Only one species is now recognized as valid, a small Bat with a forearm of about 1″·40; the fur greyish-brown above and whitish-grey beneath.

1. Rhynchonycteris naso.

Vespertilio naso, Max. zu Wied, Schinz's Thierr. i. p. 179 (1821, descr. orig.)[1]; Beitr. Nat. Bras. ii. p. 274[2]; Abbild. t. xviii.[3]

Proboscidea saxatilis, Spix, Sim. et Vesp. Bras. p. 62, t. xxxv. fig. 8 (1823, descr. orig.)[4].

Proboscidea rivalis, Spix, loc. cit.[5]

Rhinchonycteris naso, Peters, Monatsb. Ak. Berl. 1867, p. 478[6].

Rhynchonycteris naso, Dobson, Cat. Chir. Brit. Mus. p. 367, t. xx. fig. 4[7].

Hab. Guatemala, Yzabal (*Salvin & Godman*, *Mus. Brit.*[7]); Honduras (*Mus. Brit.*[7]).—Guiana[6]; Peru[6]; Brazil[6].

The range of the Long-nosed Bat extends from Brazil to Guatemala. Both Prince Wied and Mr. Dobson (who met with the species in British Guiana) give a similar account of its habits. It frequents the neighbourhood of forest-streams, remaining all day clinging, in parties of from ten to twenty individuals, to the vertical face of a rock or to the underside of a sloping tree-stem. In such a situation, Mr. Dobson remarks, "they looked like so many pinned specimens of the genus *Papilio*, the separated legs resembling the tail-like projections from the posterior margins of the wings of these insects. So flatly did they adhere to the smooth surface of the wood, and so well did the greyish fur of their bodies, and the small tufts of greyish hairs on the antebrachial membrane and on the wing-membrane on the outer side of the forearm, counterfeit the weathered surface of the wood, that it was some time before the little colony could be distinguished." Towards evening these Bats hunt along the streams, probably taking insects from the surface, a pursuit for which Mr. Dobson suggests that the downward position of the opening of the mouth is peculiarly adapted[7]. Messrs. Salvin and Godman's specimen was one of a flock disturbed from the wooded shore of the Lake of Yzabal, and knocked down by a paddle as it passed the canoe.

2. SACCOPTERYX.

Saccopteryx, Illiger, Prod. Syst. Mamm. &c. p. 121 (1811).

The second Central-American genus of Emballonuridæ has broad ears, sometimes united at their base, and a well-developed tragus; in repose the first joint of the middle

finger is folded against the upper surface of the metacarpal. But the most remarkable character is the possession of a peculiar glandular pouch opening on the upper surface of the antebrachial part of the wing-membrane. This sac, which secretes a strongly smelling matter, has been shown by Professor Reinhardt to be developed only in the males, remaining quite rudimentary in the other sex*; and further observation has confirmed his suggestion that the structure is to be regarded as a secondary sexual character, it being, in fact, strictly analogous to the frontal sac of *Phyllorhina* and the gular pouch of *Taphozous*†. Its position in the antebrachial membrane varies in the several species, and has been used by Professor Peters to diagnose his genera *Saccopteryx*, *Peropteryx*, *Cormura*, and *Balantiopteryx*‡; but these variations will here be more conveniently used as specific characters to differentiate the three recorded Central-American forms:—

1. *S. bilineata.* Opening of wing-pouch along the forearm, which measures 1″·85. Fur dark brown above with two longitudinal dorsal white streaks, greyish-brown beneath.
2. *S. canina.* Opening of wing-pouch near the edge of the antebrachial membrane, directed outwards. Forearm 1″·80. Fur blackish-brown, somewhat lighter below.
3. *S. plicata.* Opening of wing-pouch in the middle of the antebrachial membrane, directed inwards. Forearm 1″·70. Fur dark brown, lighter below; posterior margin of the wing-membrane white.

1. Saccopteryx bilineata.

Urocryptus bilineatus, Temminck, Van der Hoeven's Tijdsch. v. Natur. Gesch. p. 33, figs. 3, 4 (1838–9, descr. orig.)[1]; Mon. de Mamm. ii. p. 301[2].

Saccopteryx bilineata, Peters, Monatsb. Ak. Berl. 1867, p. 471[3]; Dobson, Cat. Chir. Brit. Mus. p. 372[4].

Hab. Guatemala, Vera Paz, Sta. Lucia (*Salvin*, *Mus. Brit.*[4]).—Colombia[4]; Guiana[1]; Brazil[4].

Of this species Mr. Dobson remarks that he is doubtful whether it will not prove to be merely a large variety of the Brazilian *S. leptura* (Schreber) with more marked white dorsal lines. He adds, "I am, however, unable to settle this question, owing to insufficiency of material to work upon, and therefore prefer for the present to recognize two species, in accordance with the views of other zoologists, and especially in deference to those of Professor Peters, who has worked out this group with great care"[4]. Mr. Salvin's specimen was shot at midday when clinging to the stem of a tree in the virgin forest near Santa Lucia, in the Pacific coast-region of Guatemala.

* Ann. & Mag. Nat. Hist. (2nd ser.) iii. pp. 386–388.

† *Cf.* Dobson, P. Z. S. 1873, pp. 241–252. ‡ Monatsb. Ak. Berl. 1867, pp. 470–481.

Originally described from Surinam, *S. bilineata* has been received by the British Museum from Pará and Bogotá, as well as from Guatemala, where Mr. Salvin obtained it both in Vera Paz and in the forests of the Pacific coast, near Santa Lucia.

2. **Saccopteryx canina.**

Vespertilio caninus, Max. zu Wied, Schinz's Thierr. i. p. 179 (1821, descr. orig.)[1]; Beitr. Nat. Bras. ii. p. 262[2]; Abbild. t. xix.[3]

Emballonura macrotis, Wagner, Arch. f. Naturg. ix. 1. p. 367 (descr. orig.)[4]; Abh. bayer. Ak. v. p. 151, t. iv. figs. 5–7[5].

Peropteryx canina, Peters, Monatsb. Ak. Berl. 1867, p. 472[6].

Saccopteryx canina, Dobson, Cat. Chir. Brit. Mus. p. 373[7].

Hab. Guatemala[6], Dueñas, Coban (*Salvin, Mus. Brit.*[7]; *Mus. Berol.*).—Venezuela[6]; Guiana[6]; Brazil[15].

Prince Wied first described this species from a female example in which the rudimentary wing-pouch was overlooked, and he consequently referred it to the genus *Vespertilio.* Its range extends northwards from Brazil through the countries mentioned above, the most northern habitat yet recorded being Guatemala, where it was obtained by Mr. Salvin.

3. **Saccopteryx plicata.** (Tab. III. fig. 4.)

Balantiopteryx plicata, Peters, Monatsb. Ak. Berl. 1867, p. 276 (descr. orig.)[1].

Saccopteryx plicata, Dobson, Cat. Chir. Brit. Mus. p. 376[2].

Hab. Mexico (*Boucard, Mus. Berol.*); Costa Rica, Punta Arenas (*Mus. Berol.*[1]).

The type of this species, and of Professor Peters's genus *Balantiopteryx*, was received from Costa Rica by the Berlin Museum; and he informs me that they have since obtained a Mexican specimen from M. Boucard. It does not occur in Mr. Salvin's Guatemalan collections; and there being no examples in the British Museum, I am indebted to Dr. Peters for leave to copy a figure of its wing, designed to illustrate his forthcoming Monograph of the Chiroptera.

3. DICLIDURUS.

Diclidurus, Max. zu Wied, Isis, 1819, p. 1629.

The most important character of this genus is the position of the tail, the proximal part of which is contained in a fold of the interfemoral membrane, while the terminal vertebræ enter a pouch in the middle of the membrane. The lower side of this pouch is developed into two horny concave plates or capsules, the first of which is subcrescentic

and the second subtriangular in form. The use of this curious arrangement is quite unknown. The muzzle is not produced beyond the lower lip; the eyes are very large, the ears short and broad, the forehead deeply concave, and the calcanea greatly elongated. Another peculiarity is the colour of the fur and membranes, which is pure white, an extremely rare tint in the general colouring of the Mammals of tropical or even of temperate latitudes.

Besides *D. albus* (which has a forearm of about 2 inches) Professor Peters has described *D. scutatus*, a smaller species, with a differently formed tail-pouch, from South America.

1. Diclidurus albus.

Diclidurus albus, Max. zu Wied, Isis, 1819, p. 1630 (descr. orig.)[1]; Beitr. Nat. Bras. ii. p. 242[2]; Abbild. t. xvi.[3]; Dobson, Cat. Chir. Brit. Mus. p. 391, t. xx. fig. 7[4].

Diclidurus freyreissii, Max. zu Wied, Abbild. Nat. Bras. t. xvi. text[5]; Gray, Zool. Voy. 'Sulphur,' p. 25, t. viii. figs. 1, 1*a*[6].

Hab. Guatemala (*Sarg*, *Mus. Berol.*[3]); Nicaragua, Pueblo Nuevo (*Belcher*, *Mus. Brit.*[4]).—Brazil[1].

The first description of this very curious Bat was sent by Prince Wied to the 'Isis' under the name of *D. freyreissii*, which the editor, Professor Oken, changed on his own responsibility to *D. albus*. The Prince observes that he would have wished to return to the original designation, but by an oversight *D. albus* had been printed on the plate in the 'Abbildungen,' and he therefore thought it best to retain that name.

Little is known of this species. First discovered in Brazil, its range extends to Nicaragua, where a specimen, now in the British Museum, was captured by Mr. Barclay, botanist to Sir E. Belcher's expedition—and to Guatemala, whence an example has been sent by Herr Sarg, probably from the neighbourhood of Coban, to the Berlin Museum. Prince Wied's original example was found concealed between the leaf-stems of a cocoa-nut-palm near the mouth of the Rio Pardo.

4. MOLOSSUS.

Molossus, Ét. Geoffroy, Ann. du Mus. vi. p. 154 (1805).
Dysopes, Illiger, Prod. Syst. Mamm. &c. p. 122 (1811).

This and the next genus belong to the group *Molossi* of Professor Peters and Mr. Dobson, and are distinguished by their large ears (often united in front), their single pair of upper incisors, their swollen upper lips, and their thickened tails, on the basal part of which the interfemoral membrane works backwards and forwards like a sheath.

Of the adaptation of their structure to their habits, Mr. Dobson observes that their long narrow wings and their power of varying the spread of the interfemoral membrane gives them great advantages in quickly altering the direction of their flight. "Of all Bats the *Molossi* appear especially suited by their peculiar conformation for capturing the most rapidly flying insects, which no doubt form the greater portion of their food. Their large and very strong acutely tubercular teeth would enable them to crush with ease the hard armour of the larger Coleoptera"*.

The genus *Molossus* is characterized by the union of the premaxillaries and consequent closeness of the upper incisors, as well as by the very narrow tragus and scarcely grooved upper lip. It is a purely Neotropical type, of which nine or ten species range from the River Plate to Mexico. Of these, the Central-American species are:—

1. *M. rufus.* Antitragus circular, as high as broad; incisors $\frac{2}{2}$, premolars $\frac{1-1}{2-2}$.
   Forearm 2″·10. Fur short, deep brown, red-brown, or fulvous.
2. *M. nasutus.* Antitragus circular, as high as broad; incisors $\frac{2}{4}$, premolars $\frac{2-2}{2-2}$.
   Forearm 2″. Fur moderately long, deep brown above, paler beneath.
3. *M. abrasus.* Antitragus semicordate, longer than high; incisors $\frac{2}{4}$, premolars $\frac{2-2}{2-2}$.
   Forearm 2″·45. Fur short, intensely black above and below.

1. Molossus rufus.

Molossus rufus, Et. Geoffroy, Ann. du Mus. vi. p. 154 (1805, descr. orig.)[1]; Gervais, Exp. de Castelnau, Mamm. p. 58, t. xii. figs. 4, 4*a*[2]; Peters, Monatsb. Ak. Berl. 1865, p. 575[3]; Dobson, P. Z. S. 1876, p. 709[4]; Cat. Chir. Brit. Mus. p. 410[5].

Molossus obscurus, Ét. Geoffroy, Ann. du Mus. vi. p. 155 (1805, descr. orig.)[6]; Peters, Monatsb. Ak. Berl. 1865, p. 575[7].

Molossus ursinus, Spix, Sim. et Vesp. Bras. p. 59, t. xxv. fig. 4 (1823, descr. orig.)[8].

Dysopes velox (Natterer), Temminck, Mon. de Mamm. i. p. 134 (1836, descr. orig.)[9].

Hab. Mexico (*Berkenbusch*, *Mus. Berol.*), Oaxaca (*Sallé*, *Mus. Brit.*[5]); Guatemala, Vera Paz (*Salvin*, *Mus. Brit.*[5]).—West Indies[5]; Ecuador[5]; Guiana[5]; Brazil[5]; Bolivia[5].

The Red Mastiff-Bat, as it has been called, was first named from specimens in the Paris Museum by the elder Geoffroy St.-Hilaire[1]; but, as Professor Peters observes, Spix's description[8] is the first that is recognizable. Gervais's figures of the skull and dentition of Geoffroy's type[2] show, however, that the species are identical; and his name may therefore be retained.

The range of *M. rufus* seems to extend throughout great part of the tropical regions of Central and South America. Along with the typical form, and also extending to the islands, is found a smaller race, which Geoffroy described as *M. obscurus*[6], in which the fur between the humerus and forearm extends further over the wing-membrane, and

* Cat. Chir. Brit. Mus. p. 403.

the upper incisors are closer together. Mr. Dobson, however, considers that when a sufficient series of specimens are compared, these variations will be found to be unimportant[5]; and in the absence of the materials for such a comparison, I follow him in treating *M. obscurus* provisionally as a variety of *M. rufus*.

An interesting account of this Bat (under the name of *M. fumarius*) will be found in the late Mr. W. Osburn's paper on the Chiroptera of Jamaica, in the 'Proceedings of the Zoological Society' for 1875. It is highly gregarious in its habits, the sexes keeping very much apart; and it inhabits both the roofs of houses and hollow trees. The males, which are provided with a large gular pouch, have a most offensive smell, especially during the breeding-season.

2. **Molossus nasutus.**

Molossus nasutus, Spix, Sim. et Vesp. Bras. p. 60, t. xxxv. fig. 7 (1823, descr. orig.)[1]; Peters, Monatsb. Ak. Berl. 1865, p. 576[2]; Dobson, P. Z. S. 1876, p. 711[3]; Cat. Chir. Brit. Mus. p. 414, t. xxi. fig. 2[4].

Molossus fumarius, Spix, Sim. et Vesp. Bras. p. 60, t. xxxv. figs. 5, 6 (1823, descr. orig.)[5].

Hab. Guatemala, Dueñas (*Salvin, Mus. Brit.*[5]).—Brazil[1].

By a comparison of Spix's types, Professor Peters was able to show that *M. nasutus* and *M. fumarius* are really only synonyms[2]; and Mr. Dobson has since fully described a specimen, obtained by Mr. Salvin in Guatemala, and preserved in spirits in the British Museum[3 4]. Although both names have been frequently used by writers, these specimens are the only ones yet known to exist in European Museums; and the last mentioned is the more valuable, as Spix's types are dried and in very bad condition.

Mr. Dobson observes that this species is quite intermediate between *M. rufus* (subgenus *Molossus*) and *M. abrasus* (subgenus *Promops*), agreeing with the former in the shape of the ear and distribution of the fur, and with the latter in dentition[4].

3. **Molossus abrasus.**

? *Molossus ater*, Et. Geoffroy, Ann. du Mus. vi. p. 153 (1805, descr. orig.)[1].

Dysopes abrasus, Temminck, Mon. de Mamm. i. p. 232, t. xxi. (1827, descr. orig.)[2].

Molossus abrasus, Peters, Monatsb. Ak. Berl. 1865, p. 574[3]; Dobson, P. Z. S. 1876, p. 712[4]; Cat. Chir. Brit. Mus. p. 415, t. xxi. fig. 3[5].

Hab. Guatemala, Coban (*Salvin, Mus. Brit.*[5]).—Guiana[5]; Peru[5]; Brazil[1].

Whether or not this may be the species named *Molossus ater* by Geoffroy, there can be no doubt as to its being the *Dysopes abrasus* of Temminck, his type in the Leyden Museum having been examined by Professor Peters[4]. Its range appears to extend from the interior provinces of Brazil, whence it was first described, to Guatemala, where Mr. Salvin obtained several specimens at Coban.

5. NYCTINOMUS.

Nyctinomus, Ét. Geoffroy, Descr. de l'Égypte, ii. p. 114 (1812).
Dinops, Savi, N. Giorn. de' Lett. p. 230 (1825).

The genus *Nyctinomus* is very closely allied to *Molossus*, but is distinguished by the truncated tragus and vertically grooved upper lip, as well as in the imperfect ossification of the intermaxillaries and the consequent separation of the upper incisors, which are placed close to the canines. It also differs markedly in geographical distribution; for, instead of being confined to the Neotropical Region, its members are dispersed over the warmer portions of both hemispheres. Three or four species are American, two of which have been found within our limits, namely:—

1. *N. gracilis.* Incisors $\frac{2}{4}$; ears united at base by a low band, antitragus not longer than high. Forearm 1″·80. Fur dark brown.
2. *N. brasiliensis.* Incisors $\frac{2}{6}$; ears not united, tragus quadrate. Forearm 1″·70. Fur dark fawn above, lighter below.

1. Nyctinomus gracilis.

Dysopes gracilis (Natterer), Wagner, Arch. f. Naturg. ix. 1, p. 368 (1843, descr. orig.)[1].
Nyctinomus gracilis, Peters, Monatsb. Ak. Berl. 1865, p. 573[2]; Dobson, P. Z. S. 1876, p. 731[3]; Cat. Chir. Brit. Mus. p. 436, pl. xxii. fig. 7[4].

Hab. Guatemala, Dueñas (*Salvin, Mus. Brit.*[4]), Peten (*Salvin, Mus. Berol.*); Panama[4]. —Ecuador[4]; Brazil[1].

This species is very nearly allied to the Brazilian *N. macrotis*, Gray; but Mr. Dobson points out that it may be easily distinguished, irrespective of its smaller size, by the lowness of the band which connects its ears and by the very different form of the antitragus. First discovered in Brazil, its range extends to Guatemala, where Mr. Salvin obtained it at Dueñas and at Peten.

2. Nyctinomus brasiliensis.

Nyctinomus brasiliensis, Is. Geoffroy, Ann. Sc. Nat. i. p. 337 (1824, descr. orig.)[1]; Peters, Monatsb. Ak. Berl. 1865, p. 573[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 263[3]; Dobson, P. Z. S. 1876, p. 731[4]; Cat. Chir. Brit. Mus. p. 437, pl. xxii. fig. 8[5].
Nyctinomus nasutus, H. Allen, Mon. Bats N. Am. p. 7 (nec Spix)[6].
Molossus mexicanus, De Saussure, Rev. et Mag. de Zool. 1860, p. 283, pl. xv. fig. 2 (descr. orig.)[7].
Molossus aztecus, De Saussure, tom. cit. p. 285, pl. xv. fig. 3 (descr. orig.)[8].
? *Dinops,* sp., Dugès, La Nat. i. p. 137[9].

Hab. N. America (from California)[6].—Mexico, Coffre de Perote, Amecameca (*Saussure*[7])

Cosmaloapan (*Boucard*, *Mus. Berol.*), Guanjuarto (*Dugès*[9]), Oazaca, City of Mexico, Tehuantepec (*Sallé*, *Boucard*, *Mus. Brit.*[5]); Guatemala, Dueñas (*Salvin*, *Mus. Brit.*[5]); Costa Rica (*Mus. Brit.*[5]), Plateau of San José (*Frantzius*, *Mus. Berol.*[3]). —South America (to Chili)[5]; West Indies[5].

This is the widest-ranging and apparently the most abundant of all the American *Molossi*, being found from the Southern States of the Union to Chili. It also extends to the West Indies, where, under the name of *N. nasutus*, its habits have been well described by the late Mr. W. Osburn*. According to his account, it is almost exclusively an inhabitant of houses, where it hangs in clusters under the shingled roofs, issuing forth in pursuit of prey about sundown, but soon returning to their retreat. They do not go to sleep, however, but are active all night, scrambling and shuffling about, and thus rendering themselves obnoxious to their human fellow-lodgers. They are abroad again long before sunrise, returning to roost in the grey of the dawn. Their voice is a sharp "click-click."

After an examination of the types, Professor Peters has united the *Molossus mexicanus*[7] and *M. aztecus*[8] of M. de Saussure with this species. His specimens were obtained on the tableland and among the mountains of Mexico, one being killed on the Coffre de Perote at an elevation of 13,000 feet, others at the foot of the Volcano of Popocatepetl.

Fam. III. PHYLLOSTOMIDÆ.

1. CHILONYCTERIS.

Chilonycteris, Gray, Ann. & Mag. Nat. Hist. iv. p. 4 (1839).

With this genus we enter on the last of our three families of Central-American Bats, an exclusively Neotropical type, which may be regarded to some extent as taking the place of the Flying-Foxes (Pteropodidæ) in the New World. As defined by Mr. Dobson, the Phyllostomidæ are Bats with cutaneous appendages surrounding or close to the nostrils, with moderate or large ears, well-developed tragus, three phalanges in the middle finger and one only in the index. Varying greatly amongst themselves in dentition, and differing much in their habits, they include purely insectivorous, largely fruit-eating, and exclusively blood-sucking forms. The Phyllostomidæ thus present great variations in structure, united by gentle intergradations; and it is consequently very difficult to arrange them in genera. The systematist must either place together forms which in any other order of Mammalia would be regarded as belonging even to distinct families, or he must accept a large number of very closely allied genera. Mr. Dobson, in his recent work, appears to me to have succeeded on the whole in keeping the middle path; and I have therefore followed his arrangement.

* P. Z. S. 1865, pp. 65–67.

In the first genus, *Chilonycteris*, the nose-leaf is very little developed, being represented by a wart on the top of the broad abruptly-truncated muzzle; a large portion of the lower lip, however, is deflected and covered with warts, which extend towards the angles of the mouth. The crown of the head is moderately elevated, the ears pointed and connected at their base; and the second lower premolar is very small. Several species are known, of which three have been found in Central America:—

1. *Ch. personata.* Lower third of inner margin of ear-conch thickened and divided by a notch from the upper two thirds. Forearm 1″·75. Fur brown, lighter beneath.
2. *Ch. rubiginosa.* Lower third of inner margin of ear-conch not thickened, continuous with upper two thirds; a transverse rounded projection on the muzzle. Forearm 2″·45. Fur variable, rusty-red to blackish-brown.
3. *Ch. davyi.* As in last species, but the wing-membranes attached along the spine instead of to the flanks; back behind the shoulders naked. Forearm 1″·85. Fur dark reddish-brown.

Owing to the peculiar attachment of the wing-membrane, the last species has been made the type of a distinct genus, *Pteronotus* of Gray*; but it does not appear to differ from the rest in any other respect.

Nothing has been recorded of the habits of the species here described; but Mr. Osburn has given an account of those of their West-Indian congeners, *Ch. macleayi*, Gray, and *Ch. parnelli*, Gray†. Their food appears to consist principally of Coleoptera.

1. **Chilonycteris personata.**

Chilonycteris personata, Wagner, Arch. f. Naturg. ix. 1, p. 367 (1843, desc. orig.)[1]; Peters, Monatsb. Ak. Berl. 1872, p. 360[2]; Dobson, Cat. Chir. Brit. Mus. p. 451[3].

Hab. Guatemala (*Mus. Berol.*[2]).—Venezuela[2]; Brazil[1].

Among the Bats collected in Brazil by Natterer, and described after his untimely death by Wagner, were the present and the next species, each of which has since proved to range considerably to the northward. *Ch. personata* goes at least as far as Guatemala, whence there is a specimen in the Berlin Museum[2]; but it is probably not abundant there, no examples being found in Mr. Salvin's large collections.

2. **Chilonycteris rubiginosa.**

Chilonycteris rubiginosa (Natterer), Wagner, Arch. f. Naturg. ix. 1, p. 367 (1843, descr. orig.)[1]; Peters, Monatsb. Ak. Berl. 1872, p. 360[2]; Dobson, Cat. Chir. Brit. Mus. p. 452, pl. xxiii. fig. 3[3].

* Mag. Zool. & Bot. ii. (1830) p. 500.

† P. Z. S. 1865, pp. 68–78.

Hab. Mexico, Mirador (*U.S. Nat. Mus.*); Guatemala, Dueñas, Ciudad Vieja (*Salvin, Mus. Brit.*[3] *& Mus. Berol.*); Costa Rica (*Rogers, Mus. Brit.*).—Colombia[3]; Brazil[3].

Professor Peters observes that *rubiginosa* is not a very happy name for this Bat, which is very variable in colour, ranging through all shades from ferruginous to blackish-brown. Hitherto it has only been recorded from Brazil, Colombia, Costa Rica, and Guatemala; but a specimen from Mirador, in Mexico, is mentioned in the list of Bats in the National Museum at Washington to which I have already alluded (p. 18).

3. **Chilonycteris davyi.**

Pteronotus davyi, Gray, Mag. Zool. & Bot. ii. p. 500 (1838, descr. orig.)[1]; Zool. Voy. 'Sulphur,' p. 24[2]; Peters, Monatsb. Ak. Berl. 1872, p. 361[3].
Chilonycteris gymnonotus (Natterer), Wagner, Arch. f. Naturg. ix. 1, p. 367 (1843, descr. orig.)[4].
Chilonycteris davyi, Dobson, Cat. Chir. Brit. Mus. p. 453, pl. xxiii. fig. 4[5].

Hab. Mexico (*Mus. Berol.*; *Liebmann, Mus. Hafn.*).—Venezuela[5]; Trinidad[1]; Brazil[4].

As already observed, Davy's Bat was generically separated by its original describer on account of the peculiarity of the attachment of the wing-membrane; but in all other characters it is hardly distinguishable from the last species. First named by Gray from a Trinidad example, it was independently described by Wagner, under Natterer's MS. name of *Chilonycteris gymnonotus*, from Brazilian specimens. According to Professor Peters it occurs as far north as Mexico, whence a specimen has been received by the Berlin Museum; and one collected by the late Professor Liebmann in the same country is preserved in the Copenhagen Museum.

2. MORMOPS.

Mormops, Leach, Trans. Linn. Soc. xiii. p. 76 (1822).

This genus is nearly allied to the last; but the cutaneous appendages of the face are exaggerated to an extraordinary extent, so that the aspect of the two known species is more wonderfully grotesque than that of any other known Bat, or is rivalled by that of *Centurio* alone. The inner edges of the rounded emarginate ears are connected by cutaneous bands with the top of the muzzle; there the bands meet and simulate a small nose-leaf, while the lips and throat are adorned with lappet-like appendages, which surround the free-edged warty chin-leaf and are continuous with the outer edges of the ears. The skull, also, is very peculiar in form, the frontal region rising almost at a right angle from the facial portion, so that the height of the cranium almost equals its length.

The *Mormops* which occurs in Central America was formerly confounded with the

West-Indian *M. blainvillii*, Leach; but may be recognized by the non junction of the cutaneous bands which unite the ears with the muzzle, by the chin-leaf being deeply indented below, and by the reddish-brown colour of the fur. Its forearm measures about 2″·15.

1. Mormops megalophylla.

Mormops blainvillii, Peters, Monatsb. Ak. Berl. 1856, p. 410[1]; Abh. Ak. Berl. 1856, p. 291, pl. i.[2]; De Saussure, Rev. et Mag. de Zool. 1860, p. 290, pl. xv. fig. 5[3]; Dugès, La Nat. i. p. 137[4] (nec Leach).

Mormops megalophylla, Peters, Monatsb. Ak. Berl. 1864, p. 381 (descr. orig.)[5]; op. cit. 1872, p. 359[6]; Dobson, Cat. Chir. Brit. Mus. p. 455, pl. xxiii. fig. 5[7].

Hab. Mexico (*Liebmann, Mus. Hafn.*), Uvero (*De Saussure*[3]), Guanaxuarto (*Dugès*[4]), Parras, Tehuantepec (*Mus. Berol.*), Mirador (*U.S. Nat. Mus.*); Guatemala, Dueñas (*Salvin, Mus. Brit.*[7]).—Colombia[7]; Venezuela[7].

Originally distinguished from its Antillean ally, *M. blainvillii*, by Professor Peters in 1864, *M. megalophylla* has since been recorded from Venezuela, Colombia, and various parts of Central America. Its habits are doubtless identical with those of *M. blainvillii*, which is described by Osburn as a Bat of great agility and rapidity of flight, but of very delicate constitution. He was unable to keep it long in confinement; but observed that in drinking "the tongue was protruded, but the water taken up by it and by the foliation of the lips was sucked in, with the head raised, by an action very like chewing" *.

3. MACROTUS.

Macrotus, Gray, P. Z. S. 1843, p. 21.

The next six genera of Phyllostomidæ are included by Mr. Dobson in his group *Vampyri*, which differs from the *Mormopes* in the nasal leaf surrounding the nostrils instead of being placed behind them; and from the *Glossophagæ* in the tongue being moderate in length and obtuse, and in the lower lip not being cleft above.

Of these genera *Macrotus* is further distinguished by its large oblong ears, united at the base, and by its long tail, of which one vertebra at least projects beyond the deeply concave margin of the interfemoral membrane. Only two species are well established, both of which are natives of Central America. These may be characterized as follows:—

1. *M. waterhousii*. Ears longer than head; nose-leaf in front raised above level of upper lip; last caudal vertebra *only* free. Forearm 2″·15. Fur reddish-brown, paler beneath.

* P. Z. S. 1865, pp. 72–74.

2. *M. bocourtianus.* Ears as long as the head; nose-leaf continuous with upper lip; last caudal vertebra and half the next free, the exserted portion of the tail equalling the thumb in length. Fur dark brown above, paler beneath.

1. **Macrotus waterhousii.**

Macrotus waterhousii, Gray, P. Z. S. 1843, p. 21 (descr. orig.)[1]; Peters, Monatsb. Ak. Berl. 1865, p. 503[2]; Dobson, Chir. Brit. Mus. p. 464, pl. xxv. fig. 1[3].

? *Macrotus californicus*, Baird, Proc. Ac. Philad. 1858, p. 117 (descr. orig.)[4]; Rep. Mex. Bound. Surv. ii., Mamm. p. 4, pl. i. fig. 2[5]; H. Allen, Mon. Bats N. Am. p. 3[6].

Macrotus mexicanus, De Saussure, Rev. et Mag. de Zool. 1860, p. 486 (descr. orig.)[7].

Hab. California[4] ?.—Mexico, Yantepec (*De Saussure*[7]).—West Indies[3].

Waterhouse's Bat appears to be peculiar to the West-Indian Islands and to the countries bordering the Gulf of Mexico; for though the continental form has been supposed to be a distinct species, as shown by the above synonymy, there appears to be no sufficient ground for its separation. The habits of this Bat, as observed in Jamaica, have been described by Gosse* and by Osburn†. It seems to be one of the most abundant of the Chiroptera of that island, where it lives in caves or in cellars, but often enters lighted rooms at night. Owing to the great proportional breadth of its wing-membrane, it makes a rushing sound in flight; and the same peculiarity causes it to appear much larger than it really is when it is observed on the wing. It feeds principally on insects, though Mr. Osburn had reason to believe that it also preys on various fruits.

2. **Macrotus bocourtianus.**

Macrotus bocourtianus, Dobson, Ann. & Mag. Nat. Hist. (4th ser.) xviii. p. 436 (1876, descr. orig.)[1]; Cat. Chir. Brit. Mus. p. 467[2].

Hab. Guatemala, Vera Paz (*Bocourt*, *Mus. Paris.*[1]).

The only specimens of Bocourt's Bat yet known are the four Guatemalan examples in the Paris Museum, which are the types of Mr. Dobson's description. The diagnosis already given will be sufficient to distinguish the species. Mr. Dobson states that these four specimens all agree in their characters, and, though not full-grown, indicate a larger species than the last.

4. VAMPYRUS.

Vampyrus (Ét. Geoffroy), Leach, Trans. Linn. Soc. xiii. p. 79 (1822).

In this genus the well-developed nose-leaf has free anterior and lateral edges, the chin has a longitudinal furrow between two naked ridges, and the tail is either very

* 'Naturalist's Sojourn in Jamaica,' pp. 295–297. † P. Z. S. 1865, pp. 74–78.

short or (externally) absent. There are four upper and either two or four lower incisors.

The accusation of blood-sucking, which has been preferred against most of the Phyllostomidæ, has caused the name *Vampyrus* to be applied to this genus. The observations of later travellers, however, especially those of Mr. Bates*, have completely vindicated the character of the species, and shown that its diet is really principally vegetarian.

Two well-marked species are known, their differences having been considered by Professor Peters to merit even generic distinction. Both are members of our fauna; and they may readily be distinguished by the following characters:—

1. *V. spectrum.* Tail absent; incisors $\frac{4}{4}$. Forearm 4″·20. Fur reddish-brown above, reddish-yellow beneath.
2. *V. auritus.* Tail short; incisors $\frac{4}{2}$. Forearm 3″·35. Fur dark grizzled-brown above, paler greyish-brown beneath.

1. Vampyrus spectrum.

Vespertilio spectrum, Linnæus, Syst. Nat. i. p. 46 (1766, ex Seba) [1].
Phyllostoma hastatum, Gray, Zool. Voy. 'Sulphur,' p. 19 (nec Pallas) [2].
Vampyrus spectrum, Peters, Monatsb. Ak. Berl. 1865, p. 504[3]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 262[4]; Dobson, Cat. Chir. Brit. Mus. p. 470, pl. xxiv. fig. 3[5].

Hab. Guatemala[5]; Nicaragua, Realejo (*Belcher*, *Mus. Brit.*[2 5]); Costa Rica, Lepanto (*Frantzius & Hoffmann*, *Mus. Berol.*[4]); Panama (*M'Leannan*, *Mus. Brit.*).—West Indies[5]; Guiana[5]; Brazil[5].

The range of the Vampire Bat includes most of the northern portion of the Neotropical Region, extending to the West-Indian Islands. On the Upper Amazons Mr. Bates found it to be by far the most abundant of the Leaf-nosed Bats, frequenting villages and churches, and feeding, as was proved by the contents of their stomachs, on various fruits and sometimes on coleopterous insects †. To the northward the species extends to Central America. There are specimens from Panama and Nicaragua in the British Museum, the latter of which was erroneously referred to *Phyllostoma hastatum* by Gray ‡. Dr. v. Frantzius says it is not uncommon in Costa Rica, but is confined to the hot regions near the coast; and Mr. Dobson tells me that he has seen examples from Guatemala, where, however, it is probably rare, there being no specimens in Mr. Salvin's collections.

* 'Naturalist on the Amazons,' ii. pp. 332, 333. † *Ibid.* ii. p. 332. ‡ *Cf. infra*, p. 42.

2. Vampyrus auritus.

Vampyrus auritus, Peters, Abh. Ak. Berl. 1856, p. 305, pl. ii. (descr. orig.)[1]; Tomes, P. Z. S. 1861, p. 104, pl. xviii.[2]; Dobson, Cat. Chir. Brit. Mus. p. 471, pl. xxiv. fig. 4[3].
Chrotopterus auritus, Peters, Monatsb. Ak. Berl. 1865, p. 505[4].

Hab. Mexico (*Deppe*, *Mus. Berol.*[1]), Mirador (*U.S. Nat. Mus.*).—Guiana[1]; Brazil[3].

This very distinct species was first described from Guiana by Dr. Peters[1], who subsequently made it the type of a distinct genus under the name of *Chrotopterus auritus*[4]. Mr. Dobson observes that it seems to connect *Vampyrus* with the genera *Lophostoma*, *Tylostoma*, and *Phyllostoma*. "With the species of *Lophostoma* it agrees closely in the form of the skull and in the dental formula, with *Tylostoma* in the form of the incisors and premolars, and with *Phyllostoma* in the presence of a glandular opening near the anterior extremity of the sternum"[3].

5. SCHIZOSTOMA.

Schizostoma, Gervais, Expéd. de Castlenau, Mamm. p. 49 (1855).

The genus *Schizostoma* differs from *Vampyrus* in having a distinct external tail about half the length of the interfemoral membrane; the first joint of the middle finger is little shorter than half the metacarpal bone; the ears are united at their base by a low cutaneous band; the well-developed nose-leaf is continuous with the upper lip in front; and the lower lip has two warts, divided by a median furrow. Several species have been described, as *S. minutum*, Gerv., *S. behni*, Peters, &c. &c. From these the only known Central-American form may be distinguished by the nakedness of the forearm and leg, by the second phalanx of the middle finger being slightly longer than the first, and by the length of the calcaneum, which exceeds that of the foot. The forearm measures about 1″·45; and the fur is brown, that of the back being pure white at its base.

1. Schizostoma megalotis.

Phyllophora megalotis, Gray, Ann. & Mag. Nat. Hist. x. p. 257 (1842, descr. orig.)[1]; Zool. Voy. 'Sulphur,' p. 17, pl. v. fig. 2[2].
Phyllostoma elongata, Gray, Ann. & Mag. Nat. Hist. x. p. 257[3]; Zool. Voy. 'Sulphur,' p. 19, pl. viii. fig. 2 (nec Geoffroy)[4].
Schizostoma elongatum, Peters, Monatsb. Ak. Berl. 1865, p. 508 (nec Geoffroy)[5].
Mimon megalotis, Gray, P. Z. S. 1847, p. 14[6].
Micronycteris megalotis, Gray, op. cit. 1866, p. 113[7].
Schizostoma megalotis, Peters, Monatsb. Ak. Berl. 1866, p. 674[8]; 1867, p. 469[9]; Dobson, Cat. Chir. Brit. Mus. p. 478, pl. xxiv. fig. 5[10].

Hab. Mexico, Oaxaca (*Sallé*, *Mus. Brit.*[1], *Mus. Berol.*[5]); Guatemala, Dueñas (*Salvin*, *Mus. Brit.*[10], *Mus. Berol.*); Honduras (*Mus. Brit.*[10]).—Bolivia[10]; Brazil[10].

The above synonymy shows the confusion which long prevailed as to the identity of this Bat. This was owing to the insufficiency of Gray's descriptions and figures, and to the way in which he bandied his two nominal species from genus to genus; and it was first rectified by Professor Peters's examination of his type specimens in the British Museum. The species has been recorded from Brazil, Bolivia, and several of the Central-American Republics, the most northern locality yet recorded being the Mexican State of Oaxaca.

6. TRACHYOPS.

Trachops, Gray, P. Z. S. 1847, p. 14.
Trachyops, Peters, Monatsb. Ak. Berl. 1865, p. 512.

Closely allied to the genera already described, *Trachyops* has the snout and chin studded with conical protuberances, and the under lip marked by a broad naked groove bordered by rows of small warts. The ears are about as long as the head; the nose-leaf has an ill-defined anterior margin; and the first joint of the middle finger is slightly inferior to half the metacarpal bone in length. The number of lower pre-molars is three on each side—not two, as has been stated, owing to the second having been overlooked in consequence of its very small size.

The only species now recognized varies in colour from brown to sooty-black; and its forearm measures about 2″·35.

1. Trachyops cirrhosus.

Vampyrus cirrhosus, Spix, Sim. et Vespert. Bras. p. 64, pl. xxxvi. fig. 3 (1823, descr. orig.)[1].
Trachyops fuliginosus, Gray, P. Z. S. 1847, p. 14 (descr. orig.)[2].
Tylostoma mexicana, De Saussure, Rev. et Mag. de Zool. 1860, p. 484 (descr. orig.)[3].
Trachyops cirrhosus, Peters, Monatsb. Ak. Berl. 1865, pp. 502, 581[4]; Dobson, Cat. Chir. Brit. Mus. p. 481, pl. xxv. fig. 2[5].

Hab. Mexico (*De Saussure*[3]; *Mus. Berol.*).—Colombia[5]; Bermuda[5]; Brazil[5].

By a comparison of the type specimens Professor Peters has been able to show that Gray's and De Saussure's species are identical with Spix's *V. cirrhosus*, of which he has given the first intelligible description[4]. The distribution of the species would therefore appear to extend from Brazil to Mexico, where M. De Saussure found it in the hot regions, and whence a specimen has been received by the Berlin Museum.

7. PHYLLOSTOMA.

Phyllostoma, Ét. Geoffroy, Ann. du Mus. xv. p. 184 (1810) *.

In this genus, the type of the family Phyllostomidæ, the ears are moderately large,

* Cuvier and Geoffroy used the term *les phyllostomes* for a "family" of *Vespertilio* in the 'Tableau Élémentaire de l'Histoire Naturelle' in 1797 (p. 105); but the above appears to be the first use of the word in systematic form.

the nose-leaf is well developed, and the lower lip has a triangular naked space bounded by two converging lines of small warts. The tail is much shorter than the largely-developed interfemoral membrane; the first phalanx of the little finger is greatly inferior in length to half the metacarpal; and two premolars only are present on each side of the lower jaw. Several species are described from various parts of South America, as *Ph. discolor*, Natt., *Ph. elongatum*, Geoffr., &c.; but only one, *Ph. hastatum*, has been recorded from our subregion. It may be distinguished by having the nose-leaf shorter than the foot, which, again, is shorter than the calcaneum, as well as by its large size (forearm 3″·20) and the uniform brown colour of its fur.

Closely allied to *Phyllostoma* is *Mimon*, Gray*, with only two lower incisors and two warts on the lower lip instead of a triangular space. I notice it here because M. De Saussure's *Vampyrus auricularis* (identified by Professor Peters with Gray's *Mimon bennetti* †) is described in that author's memoir "Sur quelques Mammifères du Mexique," although he expressly states that his type was sent from Brazil ‡; and Mr. Dobson appears to have been thus misled into adding "Mexico" to the recorded habitat of *M. bennetti* §.

1. **Phyllostoma hastatum.**

Vespertilio hastatus, Pallas, Spicil. Zool. iii. p. 7 (1767, ex Buffon)[1].
Phyllostoma hastatum, Ét. Geoffroy, Ann. du Mus. xv. p. 117, pl. lxxi.[2]; Peters, Monatsb. Ak. Berl. 1865, p. 515[3]; Dobson, Cat. Chir. Brit. Mus. p. 484, pl. xxv. fig. 3[4].

Hab. Panama, Chiriqui (*Mus. Berol.*).—Peru[4]; Guiana[4]; Brazil[4].

Next to *Vampyrus spectrum* this is the largest of the American Bats, having sometimes an expanse of wing of nearly twenty-three inches, and it has shared with that species the accusation of being a blood-sucker. This accusation in the present case has been made by such eminent authorities as Prince Maximilian and Mr. A. R. Wallace; but their evidence does not appear to be satisfactory, as will be seen when we come to treat of *Desmodus rufus*.

The range of this species, as at present known to us, does not seem to extend much further north than Panama, from which State there is an example in the Berlin Museum; for Mr. Dobson has pointed out to me that the individual from Nicaragua, recorded by Gray in the 'Voyage of the Sulphur,' is really an example of *Vampyrus spectrum* ‖.

8. CAROLLIA.

Carollia, Gray, Mag. Zool. & Bot. ii. p. 488 (1838).
Hemiderma, Gervais, Expéd. de Castelnau, Mamm. p. 43 (1855).

* P. Z. S. 1847, p. 14.
† Monatsb. Ak. Berl. 1869, p. 396.
‡ Rev. et Mag. de Zool. xii. p. 487.
§ Cat. Chir. Brit. Mus. p. 492.
‖ *Cf. supra*, p. 39.

Carollia is very closely allied to the last genus, but has the under lip marked by a large rounded protuberance enclosed between two converging rows of small warts. The ears are moderately large; the nose-leaf is not definitely separated in front from the upper lip; and the tail and the calcanea are very short. The only species recognized by recent writers has the fur greyish-brown above, paler beneath, and a forearm of about 1″·60.

Mr. Dobson regards *Carollia* as forming a connecting link between Professor Peters's groups of *Vampyri* and *Glossophagæ*, resembling many members of the latter division in the narrowness of the molars and the imperfectness of the zygomatic arches.

1. Carollia brevicauda.

Phyllostoma brevicaudum, Max. zu Wied, Schinz's Thierr. i. p. 164 (1821, descr. orig.)[1]; Beitr. Nat. Bras. ii. p. 192[2], Abbild. pl. xi.[3]

Arctibeus verrucatus, Gray, List Mamm. Brit. Mus. p. 19 (1843, sine descr.)[4].

Carollia verrucata, Gray, Zool. Voy. 'Sulphur,' p. 20, pl. viii. fig. 3 (1844, descr. orig.)[5].

Carollia azteca, De Saussure, Rev. et Mag. de Zool. 1860, p. 480, pl. xx. fig. 1 (descr. orig.)[6].

Carollia brevicauda, Peters, Monatsb. Ak. Berl. 1865, p. 519[7]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 263[8]; Dobson, Cat. Chir. Brit. Mus. p. 493, pl. xxvi. fig. 5[9].

Hab. Mexico (*De Saussure*[6], *Mus. Berol.*), Mirador (*U.S. Nat. Mus.*; *Sallé*, *Mus. Brit.*[9]), Oaxaca (*Liebmann*, *Mus. Hafn.*); Costa Rica (*Frantzius*, *Mus. Berol.*[8]); Panama, *Mus. Berol.*).—West Indies[9]; Guiana; Brazil[1].

Prince Maximilian described this Bat (though with some doubt as to its distinctness) from specimens taken in old buildings near the Rio do Espirito Santo. It has since been found in many other parts of the Neotropical Region, and has received other names, as shown by the above synonymy. Its range extends from Central Brazil to the warm and temperate provinces of Mexico, where it has been found by Sallé, Liebmann, De Saussure, and other collectors.

9. GLOSSOPHAGA.

Glossophaga, Ét. Geoffroy, Mém. du Mus. iv. p. 411 (1818).

Glossophaga et *Phyllophora*, Gray, Mag. Zool. & Bot. ii. pp. 489, 490 (1838).

Nicon, Gray, Ann. & Mag. Nat. Hist. xix. p. 507 (1847).

The next four allied genera belong to the group *Glossophagæ* of Professor Peters and Mr. Dobson, being distinguished by their very long pointed tongues, which are armed with long recurved bristle-like papillæ, and externally by their produced muzzles and deeply cleft under lips. They feed largely on fruits, lapping up the juice and soft pulp with their extensile tongues, but prey also on insects. The typical genus *Glossophaga* is further characterized by the presence of two upper and three lower premolars on each side, by the zygomatic arch being fully developed, and by the possession

of a distinct tail, which is about half the length of the well-developed interfemoral membrane. Thus restricted the genus contains only a single species, of a dark-brown colour above, but paler below, and of small size, the forearm measuring 1″·35.

1. Glossophaga soricina.

Vespertilio soricinus, Pallas, Misc. Zool. p. 48, pl. v. (1766, descr. orig.)[1].
Glossophaga amplexicaudata, Ét. Geoffroy, Mém. du Mus. iv. p. 418, pl. xviii. fig. A (1818, descr. orig.)[2].
Phyllophora nigra, Gray, List Mamm. Brit. Mus. p. 20 (1843, sine descr.)[3]; Zool. Voy. 'Sulphur,' p. 18, pl. v. fig. 1 (descr. orig.)[4].
Monophyllus leachii, Gray, loc. cit. (descr. orig.)[5]; Dugès, La Nat. i. p. 137[6].
Glossophaga leachi, Tomes, P. Z. S. 1861, p. 278[7].
Glossophaga soricina, Peters, Monatsb. Ak. Berl. 1865, p. 352[8]; op. cit. 1868, p. 362[9]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 262[10]; Dobson, Cat. Chir. Brit. Mus. p. 499, pl. xxvii. fig. 2[11].

Hab. Mexico (*Sallé*[8]), Guanjuato (*Dugès*[6]), Tehuantepec (*Mus. Berol.*), Tabasco, Mirador (*U.S. Nat. Mus.*); Guatemala (*Mus. Berol.*), Dueñas (*Salvin*, *Mus. Brit.*[7]); Nicaragua, Realejo (*Belcher*, *Mus. Brit.*[5]; *Œrsted*, *Mus. Hafn.*); Costa Rica, San José (*Frantzius*[10], *Mus. Berol.*); Panama (*U.S. Nat. Mus.*).—Venezuela[11]; West Indies[11]; Guiana[11]; Brazil[11]; Peru[11]; Bolivia[11].

This Bat, originally well described and figured by Pallas[1], has been made the type of a number of nominal species, as is shown by the above synonymy; but the confusion has been satisfactorily cleared away by Professor Peters[9]. Mr. Dobson remarks that this species is so abundant throughout the tropical parts of the Neotropical Region that specimens are found in almost every collection[11]. In its habits it doubtless resembles the nearly allied *Phyllonycteris sezekorni*, Gundl. and Peters, whose manner of feeding has been well described by the late Mr. W. Osburn *. It holds pulpy fruits, such as *Cordia*, in its teeth, and licks away the juice and flesh with its protrusile tongue.

10. ISCHNOGLOSSA.

Ischnoglossa, De Saussure, Rev. et Mag. de Zool. 1860, p. 491.

Like *Glossophaga* this genus has a complete zygomatic arch, but is at once distinguished by the greater prolongation of the muzzle, by the absence of an external tail, and by the great reduction in extent of the interfemoral membrane, which merely forms a broad margin from foot to foot. Only one species, of a dark-brown colour and with a forearm of 2″·20, is known; and specimens of it are still rare in collections.

* Under the name of *Ph. poeyi*, P. Z. S. 1865, pp. 81–85.

1. **Ischnoglossa nivalis.** (Tab. III. fig. 5.)

Ischnoglossa nivalis, De Saussure, Rev. et Mag. de Zool. 1860, p. 492, pl. xx. fig. 2 (descr. orig.)[1]; Peters, Monatsb. Ak. Berl. 1868, p. 363[2]; Dobson, Cat. Chir. Brit. Mus. p. 505[3].

Hab. Mexico, Volcan de Orizaba (*De Saussure*)[1]; Guatemala, Dueñas, Ciudad Vieja (*Salvin, Mus. Brit.*[3]).

Till recently the only known example of this curious Bat was M. de Saussure's type, which was captured on the Volcan de Orizaba close to the snow-line[1]. Unfortunately the skin of this unique specimen was lost, and the skull only was available for examination by Professor Peters[2]. Mr. Dobson, however, has been fortunate enough to find two perfect specimens preserved in spirits in Mr. Salvin's Guatemalan collections in the British Museum, and has thus been enabled to give a complete description of its external characters; from one of these examples our illustration is taken.

11. GLOSSONYCTERIS.

Glossonycteris, Peters, Monatsb. Ak. Berl. 1868, p. 364.

This genus agrees with the next and with the West-Indian *Phyllonycteris* in the imperfect ossification of the zygomatic arch, which is consequently wanting in the prepared skull—a peculiarity not found in any other known Bat. In *Glossonycterys* the molars present a well-marked W-pattern, the very short interfemoral membrane is hairy both above and below, and the tail is externally absent. The only recognized species is dark brown above, greyish-brown below; and its forearm measures about 1″·65.

1. **Glossonycteris lasiopyga.** (Tab. III. fig. 3.)

Anoura geoffroyi, Gray, Mag. Zool. & Bot. ii. p. 490 (1838, sine descr.)[1].
?*Chœronycteris peruana,* Tschudi, Faun. Peru. i. p. 71 (1844, descr. orig.)[2].
Anoura ecaudata, De Saussure, Rev. et Mag. de Zool. 1860, p. 493 (nec Geoffroy)[3].
Glossonycteris lasiopya, Peters, Monatsb. Ak. Berl. 1868, p. 368 (descr. orig.)[4].
Glossonycteris geoffroyi, Dobson, Cat. Chir. Brit. Mus. p. 508[5].

Hab. Mexico (*De Saussure*[3]); Guatemala, Choctum (*Salvin, Mus. Brit.*[5]).—Peru?[2]; Brazil[5].

M. De Saussure having sent the Mexican Bat which he had called *Anura ecaudata*[3] to Professor Peters, it was determined by that zoologist to be a new species[4], though he thinks that it may possibly be identical with Tschudi's *Chœronycteris peruana*[2]. The type of this latter is unfortunately lost; and as the original description and figure are insufficient for exact determinations, Mr. Dobson, finding that the type of Gray's genus *Anoura*[1] belongs to this species, has adopted his trivial title of *geoffroyi*[5]. But

Gray gives no specific description, and distinctly identifies his specimen with Geoffroy's *Glossophaga ecaudata* (=*Lonchoglossus caudifera*, Geoffr.)[1]; so that it appears to me that his name cannot be revived. I therefore retain Professor Peters's title as the first that can be certainly and exclusively applied to the species.

One example of this apparently rare Bat was obtained by Mr. Salvin at Choctum; and from it our figure has been drawn.

12. CHŒRONYCTERIS.

Chœronycteris (Lichtenstein), Tschudi, Faun. Peru. i. p. 70 (1844).

In this genus, as restricted by Professor Peters, the anterior molars are very narrow, without any distinct W-pattern, and the lower incisors and first upper premolars are deciduous. The muzzle is much produced; and the interfemoral membrane is well developed, the tip of the very short tail appearing on its upper surface.

The species which occurs in Central America is distinguished from the Guianan *Ch. minor*, Ptrs., by its larger size, its longer and more emarginated ears, and by the calcaneum being shorter than the foot. The fur is dark brown, and the length of the forearm about 1″·70.

1. Chœronycteris mexicana.

Chœronycteris mexicana, Tschudi, Faun. Peru. i. p. 72, pl. iii. fig. 3 (1844, descr. orig.)[1]; Peters, Monatsb. Ak. Berl. 1865, p. 354[2]; op. cit. 1868, p. 366[3]; Dobson, Cat. Chir. Brit. Mus. p. 510, pl. xxvii. fig. 5[4].

Hab. Mexico (*Brassart, Mus. Berol.*[3]), Mirador (*U.S. Nat. Mus.*); Guatemala, Dueñas (*Salvin, Mus. Brit.*[4], *Mus. Berol.*)

This species appears to be peculiar to our subregion, and is rare in collections. Besides Tschudi's type, which was obtained in Mexico by Brassart, and is still preserved in the Berlin Museum, examples were obtained at Dueñas by Mr. Salvin; and a specimen from Mirador is included in Professor Baird's manuscript list above (p. 18) alluded to.

13. ARTIBEUS.

Artibeus, Leach, Trans. Linn. Soc. xiii. p. 75 (1822).
Madatæus, Leach, tom. cit. p. 81.
Pteroderma, Gervais, Expéd. de Castelnau, Mamm. p. 34 (1855).

The Bats of the genus *Artibeus*, with which we begin Professor Peters's group of *Stenodermata*, have rather large ears, and a well-developed nose-leaf with a prominent middle rib; the chin is marked with a median wart placed between two smaller ones,

and surrounded by a row of still more minute protuberances which extend along the lips. There is no external tail; and the number of molars is singularly variable, differing, according to Mr. Dobson, even in different examples of the same species. Several species of the genus have been described, of which the two known to occur in Central America may be thus characterized:—

1. *A. perspicillatus.* Molars $\frac{2-2}{3-3}$. Front edge of nose-leaf continuous with upper lip. Forearm 2″·70. Fur brown; the head marked with more or less distinct white facial stripes.
2. *A. cinereus.* Molars $\frac{2-2}{2-2}$. Front edge of nose-leaf free. Forearm 1″·60. Fur grey-brown; head without white stripes.

1. Artibeus perspicillatus.

Vespertilio perspicillatus, Linnæus, Syst. Nat. i. p. 47 (1766, descr. orig.)[1].
Artibeus perspicillatus, Gray, Mag. Zool. & Bot. ii. p. 487[2]; Peters, Monatsb. Ak. Berl. 1865, p. 356[3]; Dobson, Cat. Chir. Brit. Mus. p. 519[4].
Artibeus jamaicensis, Leach, Trans. Linn. Soc. xiii. p. 75 (1822, descr. orig.)[5]; De Saussure, Rev. et Mag. de Zool. 1860, p. 438[6].

Hab. Mexico (*Sallé, Mus. Brit.*[4]; *De Saussure*[6]; *Berkenbusch, Mus. Berol.*); Honduras, Half-Moon Key (*Mus. Brit.*[4]); Guatemala, Dueñas (*Salvin, Mus. Brit.*[4]); Costa Rica (*Salvin, Rogers, Mus. Brit.*[4]), San José (*Hoffmann; Carmiol, Mus. Berol.*).—Colombia[4]; Venezuela[4]; West Indies[4]; Bolivia[4]; Brazil[4].

This large Bat is generally distributed throughout Tropical South America and the West Indies; and its habits were carefully observed in the latter country by Osburn *. According to his account it spends the day in caves or under the fronds of cocoanut-palms, but does not avoid the light so much as do many other Bats. Its voice is a "loud harsh screech;" and its food appears to consist almost exclusively of fruit. It is accused of gnawing its way into the young cocoanuts to feed on their jelly-like contents; but Mr. Osburn believed that in this case Rats were the real delinquents.

2. Artibeus cinereus.

Stenoderma cinereum, De Blainville, MS.[1]
Dermanura cinereum, Gervais, Expéd. de Castelnau, Mamm. p. 36, pl. xi. fig. 3 (1855, descr. orig.)[2].
Stenoderma tolteca, De Saussure, Rev. et Mag. de Zool. 1860, p. 427, pl. xv. fig. 4 (descr. orig.)[3].
Stenoderma toltecum, Peters, Monatsb. Ak. Berl. 1865, p. 356[4].
Artibeus cinereus, Dobson, Cat. Chir. Brit. Mus. p. 520[5].

Hab. Mexico (*De Saussure*[3]; *Leadbeater, Mus. Brit.*[5]); Guatemala, San Gerónimo (*Salvin, Mus. Brit.*[5]); Costa Rica (*Mus. Brit.*[5]).—Brazil[2].

* P. Z. S. 1865, pp. 64–67.

The *Stenoderma cinereum* of De Blainville's 'Catalogue Anatomique du Muséum' was first described and figured by Gervais[2]. Subsequently it was independently described by M. de Saussure[3]; but his *S. tolteca* has been identified with Gervais's species by Mr. Dobson after a comparison of Mexican examples with the type in the Paris Museum[5].

14. VAMPYROPS.

Vampyrops, Peters, Monatsb. Ak. Berl. 1865, p. 356.

This genus is very closely allied to the last, but differs in its comparatively longer muzzle and in its dentition. There are two premolars and three molars on each side above and below; and these are divided into two longitudinal portions somewhat as in the genus *Sturnira* (p. 50). The two known species agree in coloration, being marked with white stripes on the head, and having a median white line down the back, but may be easily recognized by the following characters:—

1. *V. lineatus*. Forearm 1″·65. Fur extending on the membrane at least as far as a line drawn from the elbow to the knee; dark brown above, ashy-brown beneath, four broad white streaks on head, and one down back.
2. *V. vittatus*. Forearm 2″·35. Fur not extending on the membrane beyond a line drawn from the elbow to the middle of the femur; dark brown, white stripes narrow.

1. **Vampyrops lineatus.**

Phyllostoma lineatum, Ét. Geoffroy, Ann. du Mus. xv. p. 180 (1810, descr. orig.[1]).

Vampyrops lineatus, Peters, Monatsb. Ak. Berl. 1865, p. 356[2]; op. cit. 1866, p. 430, pl. i. figs. 8–14[3]; Dobson, Cat. Chir. Brit. Mus. p. 522[4].

Vampyrops helleri, Peters, Monatsb. Ak. Berl. 1866, p. 392 (descr. orig.)[5]; Dobson, Cat. Chir. Brit. Mus. p. 524[6].

Hab. Mexico (*Heller, Mus. Vindob.*[5]; *De Saussure, Mus. Berol.*).—Colombia[6]; Brazil[6]; Paraguay[6].

The smaller, and apparently the most widely distributed, of the two species of *Vampyrops* has a range extending from Paraguay to Mexico. Two specimens collected in the latter country by Dr. Heller, and preserved in the Vienna Museum, were described as a distinct species, *V. helleri*, by Professor Peters, who considered that they differed from *V. lineatus* in their smaller size and in the greater extension of the fur on the flying-membrane. He has lately informed me, however, that he now only regards them as representing a smaller variety of the present species.

2. **Vampyrops vittatus.** (Tab. III. fig. 7.)

Artibeus vittatus, Peters, Monatsb. Ak. Berl. 1859, p. 225 (descr. orig.)[1].

Vampyrops vittatus, Peters, op. cit. 1865, p. 336[2]; Dobson, Cat. Chir. Brit. Mus. p. 324, pl. xxix. fig. 1[3].

Hab. Costa Rica (*Mus. Brit.*[3]).—Venezuela[1].

The type of this species, which was sent by Appun to the Berlin Museum from Puerto Cabello in Venezuela, is described by Professor Peters as having the front edge of the nose-leaf continuous with the upper lip; but Mr. Dobson observes that this is not the case in a better-preserved Costa Rican specimen in the British Museum (the head of which is represented in our figure), and he believes that the character depends on the dried state of the type specimen.

This is the largest species of the genus *Vampyrops*; and its range, as at present known, does not extend beyond Central America and Venezuela.

15. CHIRODERMA.

Chiroderma, Peters, Monatsb. Ak. Berl. 1865, p. 337.

Several Bats, differing from the last genus in dentition, have been separated by Professor Peters and Mr. Dobson under the above title. The most striking character is the very different structure of the upper and lower premolars, the first upper tooth of this series, in particular, presenting a peculiar oblique anterior cusp. Of the four described species, one only has been recorded from Central America; it may be at once recognized by the breadth of the four white facial stripes and by the form of the first lower premolar, which is flat-crowned without any distinct cusp. Its forearm measures about 2″.

1. **Chiroderma salvini.** (Tab. IV.)

Chiroderma salvini, Dobson, Cat. Chir. Brit. Mus. p. 532, pl. xxix. fig. 3 (skull) (1878, descr. orig.)[1].

Hab. Costa Rica (*Salvin, Mus. Brit.*[1]).

This handsome Bat has only recently been described by Mr. Dobson, who, in naming it after its discoverer, has paid a well-deserved tribute to that gentleman's investigations into the fauna of Central America. "The white streaks on the head," says Mr. Dobson, "appear to be, in this species, wider and more distinct than in any other of this group. The form of the first lower premolar, the large size of the interfemoral membrane, and the smallness of the feet at once distinguish this species"[1].

Our plate is drawn from the type specimen in the British Museum.

16. STURNIRA.

Sturnira, Gray, Ann. & Mag. Nat. Hist. x. p. 257 (1842).

Sturnira differs conspicuously from the preceding genera in the rudimentary state of the interfemoral membrane—which is reduced to a narrow fringe along the hind legs, hidden by the fur. The chin is marked with a flat median protuberance, surrounded by smaller warts; the molars are longitudinally grooved; and, as in the next genus, the males are decorated with an epaulet-like tuft of light-coloured hair on each shoulder. Two species have been generally recognized, but only one is accepted by Mr. Dobson. Its colour is variable, usually brown, more or less washed with red; and the forearm measures about 1″·70.

1. **Sturnira lilium.**

Phyllostoma lilium, Ét. Geoffroy, Ann. du Mus. xv. p. 186 (1810, descr. orig.)[1].
Sturnira spectrum, Gray, Ann. & Nat. Hist. x. p. 257 (1842, descr. orig.)[2]; Zool. Voy. 'Sulphur,' p. 22, pl. vi. fig. 1[3].
Stenoderma chilense (Gervais), Gay, Hist. de Chile, Mamm. p. 30, pl. i. fig. 1 (1847, descr. orig.)[4].
Sturnira chiloensis, Frantzius, Arch. f. Naturg. xxxv. 1, p. 262 (nec *Vespertilio chiloensis*, Waterh.)[5].
Sturnira lilium, Dobson, Cat. Chir. Brit. Mus. p. 538, pl. xxx. fig. 4[6].

Hab. Guatemala (*Mus. Berol.*); Honduras (*Dyson, Mus. Brit.*[6]); Costa Rica (*Frantzius*[5], & *Hoffmann, Mus. Berol.*).—West Indies[6]; Peru[6]; Brazil[6]; Paraguay[1]; Chili[4].

This Bat has a wider southern range than most of the species on our list, going as far south as Paraguay[1] and Chili[4]. It appears to be not uncommon in most of the Central-American States, but has not yet been recorded from Mexico.

17. CENTURIO.

Centurio, Gray, Ann. & Mag. Nat. Hist. x. p. 259 (1842).

Excepting perhaps *Mormops*, the Bats of the present genus are the most grotesquely hideous of the whole order. Resembling the genera last described in general structure, *Centurio* differs in having only one lower premolar on each side; in the peculiar transparent patches on the wing-membranes, puckered into transverse folds by parallel muscular bands; in the large lobate ears; and, above all, in the appearance of the naked face, which is covered all round the greatly shortened muzzle with deep wrinkles and raised ridges, symmetrically disposed and forming a most strange pantomimic mask in which the nose-leaf may be said to be lost. Under the chin pass several transverse ridges, which vary in number and development in the two described species, both of which are natives of our subregion, and which may be thus diagnosed:—

1. *C. senex.* Three ridges on throat, the lowest moderately developed, covered with hair. Forearm 2″·01. Fur brown; shoulder-tuft white, wing-membranes partially transparent and colourless.
2. *C. macmurtrii.* Five ridges on throat, the uppermost small, the lowest greatly developed, hairy without, naked within. Fur and membranes as in the last.

1. Centurio senex.

Centurio senex, Gray, Ann. & Mag. Nat. Hist. x. p. 259 (1842, descr. orig.)[1]; Zool. Voy. 'Sulphur,' p. 27, pl. vii.[2]; Peters, Monatsb. Ak. Berl. 1865, p. 524[3]; Dobson, Cat. Chir. Brit. Mus. p. 543, pl. xxx. fig. 6[4].

Centurio flavogularis, Lichtenstein & Peters, Monatsb. Ak. Berl. 1854, p. 335 (descr. orig.)[5]; Abh. Ak. Berl. 1854, p. 87, pl. i.[6]

Centurio mexicanus, De Saussure, Rev. et Mag. de Zool. 1860, p. 381 (descr. orig.)[7].

Hab. Mexico (*De Saussure*[7]; *Hille*, *Mus. Berol.*[6]), Mirador (*Sartorius*, *U.S. Nat. Mus.*); Central America (*Belcher*, *Mus. Brit.*[4]).

The late Dr. Gray described the "Wrinkled-faced Epaulet-Bat" from a specimen obtained during the voyage of H.M.S. 'Sulphur,' and supposed to be from Amboyna[1]; but subsequently he was led to believe that there was some mistake as to the locality[2]. There is now no doubt that the specimen must have been obtained in Central America; and Professor Peters[3] has identified it with the species formerly separated by Lichtenstein and himself as *C. flavogularis*[5] and with the *C. mexicanus* of M. De Saussure[7]. The type of *C. flavogularis* was originally stated to be from Cuba; but Dr. Peters informs me that this proves to be an error.

2. Centurio macmurtrii. (Tab. III. fig. 8.)

Centurio (*Trichocoryes*) *m'murtrii*, H. Allen, Proc. Acad. Philad. 1861, p. 360 (descr. orig.)[1].

Hab. Mexico, Mirador (*Sartorius*, *U.S. Nat. Mus.*[1]); Guatemala (*Mus. Berol.*).

The type of this species was sent to the Smithsonian Institution along with an example of *C. senex*. According to Dr. Allen's description, *C. macmurtrii* is even a more remarkable animal than that species, from which it differs principally in the development of the lowermost of the throat-ridges. "Instead of being but a slight elevation of furred skin, it forms a large hairy mask, which, when elevated, hides the face. It is naked within, furred without. The lower and middle parts are sparsely covered with soft hair, while the upper portion possesses two thick clumps of fine fur, one on each side of the central line. This development of the skin gives the animal a very grotesque appearance. The entire arrangement might with propriety be compared to an ancient vizor surmounted with rosettes."

Mr. Dobson has included the name of *C. macmurtrii* with a mark of interrogation in his synonymy of *C. senex*, and has suggested that it is probably the adult male of that

species, "of which females alone appear to have been hitherto obtained"*. But Professor Peters has pointed out to me that this is a mistake, the type of *C. flavogularis* (=*C. senex*) being an adult male †, as is another specimen of *C. senex* in the Berlin Museum. It is possible, however, that Mr. Dobson is right, and that the peculiarities of *C. macmurtrii* are male characters which are only developed at particular seasons. But till this is shown to be the case it will be best to treat the species as distinct.

The type specimen is the only one hitherto recorded; but Dr. Peters informs me that the Berlin Museum has recently obtained a second, also a male, from Guatemala; and he has kindly sent me a beautifully finished drawing of its very remarkable physiognomy, from which our figure has been carefully copied.

18. DESMODUS.

Desmodus, Max. zu Wied, Beitr. Nat. Brasil. ii. p. 231 (1826).

This genus, with its close ally *Diphylla*, forms the group or subfamily Desmodontes of Peters and Dobson. So greatly do these genera differ from all other Bats in the structure of their alimentary system that they have been held by Professor Huxley and others to form a third primary division of the Order‡, equivalent to the fruit-eating and insectivorous sections. On the other hand, they agree closely with other Phyllostomidæ in the rest of their structure; and Professor Peters has pointed that the Stenodermine genera, as here arranged, show a gradual approach to their peculiar dentition.

In external appearance *Desmodus* is not strikingly different from the tailless Stenodermes, the nose-leaf being small but distinct, and the interfemoral membrane reduced to a mere margin. The single pair of upper incisors are enormously large, and are shaped like canines; the four lower cutting-teeth are small; and the grinders, two above and three below, are narrow single-rooted premolars, true molars being absent. The œsophagus is much constricted; and the cardiac portion of the stomach is very strangely developed, being produced into a long tubular cæcum. All these peculiarities have evident connexion with the food of the animal, which, as will be seen below, appears to consist entirely of the blood of other vertebrates.

The only species now recognized is a large Bat, with a wing-expanse of about 15 inches and a forearm of about 2″·50; the fur is reddish-brown and the membranes dusky.

1. **Desmodus rufus.**

Vespertilio spectrum, Azara, Hist. Nat. Quad. Paraguay, ii. p. 273 (nec Linn.)[1].

Desmodus rufus, Max. zu Wied, Beitr. Nat. Brasil. ii. p. 232 (1826, descr. orig.), Abbild. pl. xvii.[2]; Tomes, P. Z. S. 1861, p. 278[3]; Dobson, Cat. Chir. Brit. Mus. p. 547, pl. xxx. fig. 7[4].

Desmodus d'orbignyi, Waterhouse, Zool. Voy. 'Beagle,' Mamm. p. 1, pl. i. (1839, descr. orig.)[5].

* Cat. Chir. Brit. Mus. p. 543. † *Cf* Monatsb. Ak. Berl. 1854, p. 335; Abh. 1854, p. 88.

‡ *Hæmatophilina* (Waterhouse), Huxley, P. Z. S. 1865, p. 388.

Hab. Mexico (*Deppe, Mus. Berol.*), Oaxaca (*Mus. Brit.*[4]); Guatemala (*Mus. Berol.*), Dueñas (*Salvin, Mus. Brit.*[4]).—Ecuador[4]; Peru[4]; Brazil[2]; Paraguay[1]; Chili[5].

It has already been observed that the accusation of blood-sucking has been brought against many of the so-called "Vampires;" but trustworthy observers have now clearly proved that the present species and the allied *Diphylla ecaudata* are the true culprits. The first positive scientific testimony against *Desmodus* was that of Mr. Darwin, who brought home a specimen which was caught red-handed on the withers of a horse in his own presence[5]. Since then the negative evidence of Mr. Bates * and Professor Reinhardt †, and the anatomical investigations of the latter and of Professors Huxley ‡ and Peters §, have been confirmed and completed by the conclusive testimony of Dr. Hensel ‖, who clearly showed that the wounds of Bat-sucked beasts could only be inflicted by the peculiar teeth of the Desmodontes, and were identical with those which he himself received in the capture of *D. rufus*. He believes that, in the absence of Horses or Mules, these Bats prey on small Rodents and on Birds.

The range of *Desmodus rufus* extends from Chili in the south to Guatemala and Southern Mexico, from both of which countries there are specimens in the British and Berlin Museums.

19. DIPHYLLA.

Diphylla, Spix, Sim. et Vesp. Bras. p. 68 (1823).

This, the last of our numerous genera of Central-American Bats, is closely allied to *Desmodus*; but it is distinguished by the non-development of the interfemoral membrane in the middle portion, by the presence of a short calcaneum, by the breadth of the lower incisors, and by the possession of a single true molar on each side, above and below, though the last are merely rudimentary. The only known species is reddish-brown above and yellowish-white beneath; its forearm measures about 2 inches.

1. **Diphylla ecaudata.** (Tab. III. fig. 6.)

Diphylla ecaudata, Spix, Sim. et Vesp. Bras. p. 68, pl. xxxvi. fig. 7 (1823, descr. orig.)[1]; Dobson, Cat. Chir. Brit. Mus. p. 550[2].

Hab. Guatemala (*Salvin, Mus. Berol.*).—Ecuador; Brazil[1].

Little has been heard of this Bat since its discovery in Brazil by Spix; and the most northern locality hitherto recorded has been Ecuador, whence Mr. Fraser sent a specimen which had been taken, in the act of sucking a man's blood, on the Rio Napo¶. Professor Peters, however, informs me that there is a specimen in the Berlin Museum,

* Nat. on R. Amazons, ii. pp. 332, 333.
‡ P. Z. S. 1865, pp. 386–390.
‖ Zool. Garten, 1869, pp. 135–140.
† Vidensk. Meddel. 1865, pp. 241–244.
§ *Tom. cit.* p. 389.
¶ Tomes, P. Z. S. 1860, p. 212.

which was captured by Mr. Salvin in Guatemala, and obtained from that gentleman in 1864; and, through Dr. Peters's courtesy, I am enabled to copy the figure prepared to illustrate the work on the Chiroptera on which he has been so long engaged.

Order III. INSECTIVORA.

This order is but scantily represented in the New World, two families only (Talpidæ and Soricidæ) being found there. Both are confined entirely to the Nearctic Region, with the exception of two genera of Soricidæ, which have extended their range as far as Guatemala and Costa Rica respectively. The total absence of Insectivores from the fauna of the Neotropic Region in general is a striking fact, but may reasonably be attributed to the competition of the numerous small insect-eating Edentates and Marsupials, whose range they thus overlap in Central America.

Fam. I. SORICIDÆ.

1. SOREX.

Sorex, Linnæus, Syst. Nat. p. 73 (1766).

The American species of this very widely distributed genus have lately been divided by Dr. Elliott Coues * into three sections, founded in part on the number of "unicuspids" in the upper jaw, between the large median incisors and the molars. In regard to the homologies of these teeth I have here adopted the views of Dr. E. Brandt †, which seem to me to be more satisfactory than any other that have hitherto been propounded. Dr. Coues's three subgenera are *Sorex* as restricted, *Microsorex*, and *Notiosorex*, the two last having been thus named in manuscript by Professor Baird as far back as 1861. Only the first and last demand our attention as occurring in Central America. In *Sorex* there are *five* "upper unicuspids" (four incisors and a premolar being present), making the whole number of teeth $\frac{20}{12}=32$; the ears are moderate, and the tail more than half the length of the head and body. In *Notiosorex* only *three* upper unicuspids are present, so that the teeth are $\frac{16}{12}=28$; the ears are thinly haired, large, and conspicuous, and the tail less than half the length of the head and body.

* Bull. U.S. Geol. & Geogr. Surv. iii. pp. 643–647 (1877).

† 'Izslyedovaniya o zubnoi sistemye kutor i zemleroek,' St. Petersburg, 1865 (cf. Zool. Rec. 1866, pp. 24–27); "Untersuchungen über das Gebiss der Spitzmäuse," Bull. Soc. Imp. Nat. Moscou, xli. (2de pt.) pp. 76–95, pls. i.–vi.; xlvi. (2de pt.) pp. 1–79.

Dr. Coues remarks that this subgenus is related to the European *Crocidura*; and, from his descriptions, I should hardly suppose it to be separable. In any case the absent unicuspids are probably the fourth incisor and the premolar, as Dr. Brandt has shown to be the case in *Crocidura*.

As far as we yet know, each of these subgenera is represented within our limits by a single species. These may be easily distinguished by the following characters:—

1. *S. veræ-pacis.* Teeth 32. Uniform dark dusky brown, hardly lighter beneath. Length about 3″·40, of tail 2″·00.
2. *S. evotis.* Teeth 28. "Hoary brownish cinereous above, ashy-grey beneath." Length 2″·90, of tail 0″·90.

1. **Sorex veræ-pacis.** (Tab. V. fig. 1.)

Corsira temlyas, Gray, P. Z. S. 1843, p. 79 (sine descr.)[1].
Corsira teculyas, Gray, MS. (in Mus. Brit.)[2].
Sorex veræ-pacis, Alston, P. Z. S. 1877, p. 445 (descr. orig.)[3].

Hab. Guatemala, Coban (*Mus. Brit.*[1]).

In 1843 the late Dr. Gray named, without any description, a number of Mammals obtained by the British Museum from Vera Paz, Guatemala, and purchased, I believe, from Mr. Leadbeater. Among these were two large dark long-tailed Shrews, on which Gray bestowed the barbarous title *temlyas*[1], afterwards altered on the Museum labels to *teculyas*. By the kindness of Dr. Günther I was enabled to have the skull of one of these specimens extracted, and was thus able to show that it belonged to restricted *Sorex* with thirty-two teeth, the form and proportions of which bear a considerable resemblance to those of the European *S. minutus*. I have hitherto met with no other examples of this Shrew than Gray's types; and it therefore appears probable that the species is not common in Guatemala.

2. **Sorex evotis.**

Sorex (*Notiosorex*) *evotis*, Coues, Bull. U.S. Geol. & Geogr. Surv. iii. p. 652 (1877, descr. orig.)[1].

Hab. Mexico, Mazatlan (*Bischoff, U.S. Nat. Mus.*[1]).

According to Dr. Coues this species is nearly allied to *S. crawfordi*, Baird (which inhabits New Mexico), but differs not only in colour but in its much larger size and proportionally shorter tail. "The coloration is very nearly that of some specimens of *Crocidura leucodon*, but rather more cinereous above and less distinctly bicolor"[1]. The still unique types of both *S. crawfordi* and *S. evotis* are in the National Museum at Washington.

2. BLARINA.

Blarina, Gray, P. Z. S. 1837, p. 124.
Brachysorex, Duvernoy, Mag. de Zool. 1842, p. 37.

This curious New-World form seems worthy of full generic distinction, being specially characterized by the minute size and peculiar structure of the external ear-conch, which is folded forwards so as to cover and completely conceal the auditory meatus. The genus has been divided by Dr. Elliott Coues into restricted *Blarina* and *Soriciscus*—the former with five "upper unicuspids," making the whole number of teeth $\frac{20}{12}=32$, the latter with only *four*, so that the teeth number $\frac{18}{12}=30$ in all *. From Dr. E. Brandt's observations it appears that the tooth which is wanting in the latter section is the last lateral incisor †.

The only two species of *Blarina* which have yet been recorded from our sub-region belong to *Soriciscus*, and may be diagnosed as follows:—

1. *B. micrura.* Dark greyish-brown above, shading to dull grey beneath, washed with fulvous on the breast and belly. Length 2″·30, of tail 0″·80.
2. *B. mexicana.* "Unicolor, entirely sooty blackish-brown, merely a little paler below." Length 2″·50, of tail 1″·00.

1. **Blarina micrura.** (Tab. V. fig. 2.)

Corsira tropicalis, Gray, P. Z. S. 1843, p. 79 (sine descr.)[1].
Sorex micrurus, Tomes, P. Z. S. 1861, p. 279 (descr. orig.)[2].
?*Sorex*, sp., Frantzius, Arch. f. Naturg. xxxv. 1, p. 323[3].
Blarina micrura, Alston, P. Z. S. 1877, p. 446[4].
Blarina (*Soriciscus*) *micrura*, Coues, Bull. U.S. Geol. & Geogr. Surv. iii. p. 638 (footnote)[5].

Hab. Guatemala, Coban (*Mus. Brit.*[1 4], *Salvin*[2]); Costa Rica (*Frantzius*[3]; *Carmiol, U.S. Nat. Mus.*[5]).

This is another of the Guatemalan animals which Gray named in 1843 without giving any characters[1]; and it was not till eighteen years later that the species was described by Mr. Tomes from specimens collected by Mr. Salvin near Coban (not Dueñas as stated by Mr. Tomes), one of which was picked up dead in a forest path[2]. Further south of Guatemala a small species of Shrew was observed in Costa Rica by Dr. v. Frantzius; but he was unable to obtain specimens. Examples from that country, however, have lately been sent to the Washington Museum by the well-known collector Carmiol, one of which was kindly intrusted to me by Dr. Elliott Coues; and I was unable to find that it differed in any respect from the *Corsira tropicalis* of Gray and the *Sorex micrurus* of Tomes.

Dr. Coues remarks that the Costa-Rica Shrew is "very closely related to United-

* Bull. U.S. Geol. & Geogr. Surv. iii. pp. 647–649 (1877).

† Zool. Rec. 1866, p. 27.

States species like *B. cinereus*, *B. exilipes*, and *B. berlandieri*, if really distinct;" and in a subsequent letter to me he says that he suspects that intermediate links between it and the more northern forms may yet be discovered. None such, however, are yet known, and in the meantime the validity of the species must be recognized.

2. Blarina mexicana.

Blarina mexicana, Baird, MS.

Blarina (*Soriciscus*) *mexicana*, Coues, Bull. U.S. Geol. & Geogr. Surv. iii. p. 652 (1877, descr. orig.)[1].

Hab. Mexico, Jalapa (*de Oca*, *U.S. Nat. Mus.*[1]).

Nothing is known of this Shrew beyond Dr. Coues's description of his type. He remarks that the species combines the dental characters of his subgenus *Soriciscus* with the external appearance of *Blarina* proper, "resembling *B. talpoides* in its uniform blackish colour, though it is still darker as well as much smaller"[1].

Order IV. CARNIVORA.

All the five New-World families of land Carnivora, Felidæ, Canidæ, Procyonidæ, Mustelidæ, and Ursidæ, are found in Central America, although the latter only just crosses the northern boundary. The great majority of the genera are common to both the Neotropical and Nearctic Regions; but three (*Nasua*, *Cercoleptes*, and *Galictis*) belong essentially to the former, two (*Mephitis* and *Taxidea*) to the latter, while two others (*Bassaris* and *Bassaricyon*) are peculiar to the subregion. The species also are nearly evenly balanced between the two faunas; so that in this order we have no such marked preponderance of Neotropical affinities as we have found in those hitherto under consideration.

Fam. I. FELIDÆ.

1. FELIS.

Felis, Linnæus, Syst. Nat. i. p. 60 (1766).

In the New World the almost cosmopolitan genus *Felis* is widely distributed throughout both the Neotropical and Nearctic Regions; but, with the exception of the Lynxes, the Cats are rather characteristic of the former than the latter, several of the species being peculiar to the southern fauna, while others only advance a short way beyond its northern boundary. The seven species which have been found in the Central-American subregion may be thus characterized:—

Pr. 3

1. *F. onca.* Bright tawny; spots along spine black; middle of rosettes on sides paler than the ground-colour, with central black spots. Length of head and body about 50″, tail 24″.
2. *F. pardalis.* Greyish tawny; rosettes on sides elongated, with rufous centres, often confluent; tail with complete rings. Head and body about 36″, tail 24″.
3. *F. tigrina.* Bright tawny; rosettes on sides irregular, with fulvous centres; tail with incomplete rings or separate spots. Head and body about 24″, tail 12″.
4. *F. concolor.* Uniform greyish or reddish fawn; ears and upper lip black, a patch on each side of muzzle white. Head and body about 40″, tail 24″.
5. *F. yaguarundi.* Uniform dark fulvous or grey; the fur black, minutely ringed with fulvous or white. Head and body about 30″, tail 20″.
6. *F. eyra.* Form elongate; legs short; uniform pale rufous. Head and body about 20″, tail 12″.
7. *F. rufa.* Greyish red-brown, more or less spotted above; inside of legs with transverse bars. Head and body about 30″, tail 5″.

1. **Felis onca.**

Felis onca, Linnæus, Syst. Nat. i. p. 61 (1766, descr. orig.)[1]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 279[2]; Dugès, La Nat. i. p. 137[3]; Elliot, Mon. Felidæ, pt. i.[4]

Felis onza, Baird, Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 6[5].

Leopardus hernandesii, Gray, P. Z. S. 1857, p. 278, Mamm. pl. lviii. (descr. orig.)[6].

Leopardus onca, Moore, P. Z. S. 1859, p. 51[7].

Tlatlauhqui Ocelotl seu *Tigris Mexicana,* Hernandez, Rer. Med. Nov. Hisp. p. 498.

Tigre of Spanish Americans.

Hab. North America, from the Red River of Louisiana southwards[5].—Mexico (*Gray*[6], *Dugès*[3], *Baird*[5]); Guatemala, Quirigua, forests north of Coban, and whole Costa Grande (*Godman & Salvin*); British Honduras, Belize (*Leyland*[7]); Honduras, Omoa (*Leyland*[7]), Nicaragua, Chontales (*Belt*); Costa Rica (*Frantzius*[2]).—South America to the Rio Negro of Patagonia[4].

The range of the Jaguar is a wide one, extending from the Red River of Louisiana in the north to the Rio Negro of Patagonia in the south. No well-marked geographical races appear to have become established; but there is a considerable amount of individual variation in the depth of the ground-colour, and in the size and arrangement of the black markings. A Mexican Jaguar, formerly living in the Zoological Society's Gardens, in which the black edges of the rosettes were much broken up into small spots, was provisionally separated by Dr. Gray as *Leopardus hernandesii*[6]; but he subsequently

became convinced that it was only a variety*: this specimen is now in the British Museum, and has heen well figured by Mr. Wolf in the first part of Mr. D. G. Elliot's magnificent 'Monograph of the Felidæ.' The black variety, also figured in the same plate, is well known though rare; and according to Dr. v. Frantzius it has occurred within our limits near the Rio San Juan, in the north of Costa Rica [2].

The same writer informs us that in Costa Rica the Jaguar inhabits the depths of the forests, especially those of the mountains, as on the Dota and Candelaria ranges, and even ascends, as on the Volcano of Irazu, to an altitude of 8000 feet. Occasionally it approaches the settled districts, when hunting parties are at once organized; for it is very destructive to the cattle. "El Tigre" is pursued and brought to bay by trained hounds, when the hunters attack it with lances in preference to firearms, which they distrust from their liability to miss fire in the moist atmosphere of the virgin forests [2].

In Nicaragua the late Mr. Belt met with Jaguars; and he was assured by the natives that an active warfare was carried on between them and the *Wari* or Peccaries. From what he learned he did not believe that in Central America the Jaguar ever made unprovoked attacks on mankind, but that when wounded it became very savage and dangerous †.

In Guatemala Messrs. Godman and Salvin tell me that Jaguars are very generally distributed over the country wherever large tracts of primæval forest are to be found. Throughout their travels, however, they never actually met with one, though not unfrequently tracks were seen in the mud at the side of a pool or stream where an animal had gone to drink. When passing the village of Quirigua, in the lower portion of the Motagua valley, they purchased a fine fresh skin that had been taken from a "Tigre" killed a few days previously; and in a similar manner the presence of Jaguars was traced in many parts of the country, the practice of the natives being to stretch the skin of a freshly killed animal on the ground before their ranchos until dry, or to hang it before their doors to tempt a passing traveller to purchase it. Once, in the Costa Grande of the Pacific coast, Mr. Salvin counted in an Indian's rancho nine Jaguars' skulls, which had been taken from animals killed during the previous year or two. Throughout this district, where vast tracts of forest spread over the whole country, Jaguars are doubtless very numerous and do a considerable amount of injury to the cattle which are reared in many haciendas. In Vera Paz, especially in the forests which lie between Coban and the confines of Peten, and also eastwards to the Gulf of Honduras, Jaguars would seem to be equally abundant, as several skins were obtained at Choctum and other places situated in the forest north of Coban; and "Tigre" skins are not unfrequently brought for sale to the Indian market of the latter town, where a native woman may be seen sitting with a small basket of beans of the wild cacao, some

* Cat. Carn. &c. Mamm. Brit. Mus. p. 12.

† 'Naturalist in Nicaragua,' pp. 30, 144.

pods of vanilla, and a Jaguar's skin before her for sale—the choicest products of the forest surrounding her husband's rancho. Stories are told of Jaguars attacking natives, which may in some cases be true; but truth and fiction are so hopelessly mingled that it were best to withhold credence in most cases. The height to which the Jaguar ascends in the mountains of Guatemala is not easy to decide; but where the mountain forests are continuous with the low-lying woods of the hotter parts it is probable that this animal ascends to a considerable height, say to 6000 to 8000 feet. This would depend upon local circumstances, such as the existence of a cattle-farm or other similar attraction. Still Tapirs are found at this elevation, and Jaguars may follow them.

2. **Felis pardalis.**

Felis pardalis, Linnæus, Syst. Nat. i. p. 62 (1766, descr. orig.)[1]; Baird, Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 8[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 280[3]; Allen, Bull. U.S. Geol. Surv. ii. p. 322[4]; Elliot, Mon. Felidæ, pt. iii.[5]

Leopardus pardalis, Moore, P. Z. S. 1859, p. 51[6].

Leopardus pictus et *L. griseus*, Gray, Ann. Nat. Hist. x. p. 260 (1842, descr. orig.)[7].

Tlacoozelotl, Tlalocelotl, Catus Pardus, Mexicanus, Hernandez, Rer. Med. Nov. Hisp. p. 512[8].

Manigordo of Costa-Ricans[3].

Hab. North America, from Arkansas southwards[5].—Mexico (*Baird*[2]), Matamoras, Mirador, Tehuantepec (*U.S. Nat. Mus.*[4]); Guatemala, Vera Paz (*Godman & Salvin, Mus. Brit.*); Honduras (*Leyland*[6]); Nicaragua (*Belt*); Costa Rica (*Frantzius*[3]; *U.S. Nat. Mus.*[4]); Panama.—South America to Patagonia[5].

The Ocelot, perhaps the most beautiful of the Cat tribe, is also one of the most variable in its markings, hardly any two specimens being exactly alike. It has consequently been broken up into several species; but the variations appear to be really only individual peculiarities, and to be quite unconnected with geographical distribution. *F. picta* of Gray[7], beautifully figured by Mr. Wolf in the first series of the 'Zoological Sketches,' is a large dark variety with the rosettes of the flanks well separated and defined, while *F. grisea*[7] is very pale and grey in ground-colour. Of the latter there are several Guatemalan skins in the British Museum, which show much variety in their markings. These variations are well shown in Mr. Wolf's fine plate in Mr. Elliot's Monograph[5]. Mr. Allen has shown that, as in many other southern types of North-American Mammals, the Ocelot diminishes considerably in size towards the northern limits of its range.

The range of the Ocelot is not less extensive than that of the Jaguar, finding its northern limit in Arkansas, and extending southwards to Paraguay, and, according to Mr. Elliot, to Patagonia[5]. It occurs throughout Central America, and, though not included in Dr. Dugès's list, extends throughout Mexico to the South-western United

States, where it is known as the "Leopard-Cat" by the Texan trappers [2]. In Costa Rica, where it is called *Manigordo* (literally, *fat paws*), Dr. v. Frantzius says that, in spite of its smaller size, it is as much dreaded as the Jaguar [3]. Captain Dampier seems to have had an equal respect for the "Tigre-Cat," which he thus describes in his 'Voyages to Campeachy':—

"The Tigre-Cat is about the Bigness of aBull-Dog, with short Legs, and a truss Body shaped much like a Mastiff, but in all things else, (*viz.*) its Head, the colour of its Hair, and the manner of its Preying, much resembling the Tigre, only somewhat less. Here are great numbers of them. They prey on young Calves or other Game; whereof there is plenty. And because they do not want Food, they are the less to be feared. But I have wisht them farther off, when I have met them in the Woods; because their Aspect appears so very stately and fierce".*

Though skins of both the Ocelot and the Margay may often be purchased in the villages of Guatemala, little is seen or heard of them by travellers passing through the country. Messrs. Godman and Salvin remark that the distribution of the two species would seem confined to the heavily-timbered districts, especially those of the low-lying and hotter parts of the country.

3. **Felis tigrina.**

Felis tigrina, Erxleben, Syst. Reg. An. p. 517 (1777, descr. orig.) [1]; Frantzius, Arch. f. Nat. xxxv. 1, p. 280 [2]; Elliot, P. Z. S. 1877, p. 704 [3].

Felis mitis, F. Cuvier, Hist. Nat. Mamm. (livr. 18), ii. pl. 137 (1820, descr. orig.) [4]; Tomes, P. Z. S. 1861, p. 280 [5]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 281 [6].

Felis macrura, Max. zu Wied, Beitr. Nat. Bras. ii. p. 371 (1826, descr. orig.) [7].

Felis mexicana, de Saussure, Rev. et Mag. Zool. 1860, p. 1 (descr. orig., nec Desmarest) [8].

Cauzel of Costa-Ricans [2].

Hab. Mexico, Alvarado (*de Saussure* [8]); Guatemala, La Grande, Dueñas (*Salvin, Mus. Brit.* [5]); British Honduras, Belize (*Mus. Brit.*); Costa Rica (*Frantzius* [2 6]); Panama, Calovevora (*Arcé, Mus. Brit.*).—South America to Paraguay.

Three species of Margays or American Tiger-Cats have been usually recognized by zoologists, and have been characterized by differences in coloration and in relative length of tail. Mr. D. G. Elliot, however, has expressed his conviction that these differences are quite inconstant; and, after carefully examining the fine series of specimens in the British and Paris Museums in his company, I fully agree in his conclusions. Details of comparison are given at length in Mr. Elliot's paper [3]; and it will be enough here to say that we were quite unable to find any definite character by which *Felis tigrina*, *F. mitis*, and *F. macrura* could be separated. There seems to me to be

* Dampier's Voyages, ii. p. 62.

no doubt that M. de Saussure's *F. mexicana* * is also identical, and that only one species of Tiger-Cat, very variable in colour and proportions, ranges from Paraguay to Mexico.

In Central America the Margay, like the Ocelot, is generally distributed in the warm lowlands. Specimens have been sent by Arcé to the British Museum from Panama; and Dr. v. Frantzius tells us that in Costa Rica, where it is called *Cauzel*, its tracks are very commonly found on the banks of streams which run in narrow gorges tangled with underwood. In Guatemala Mr. Salvin once obtained a maimed specimen which had just been caught by hunters at La Grande, in the Pacific coast-region; but all the other skins he collected were purchased from natives. The type of M. de Saussure's *F. mexicana* was procured near Alvarado, in the State of Vera Cruz[8]; and this appears to be the most northern locality which has yet been recorded.

4. **Felis concolor.**

Felis concolor, Linnæus, Mantissa, p. 522, pl. ii. (1771, descr. orig.)[1]; Baird, Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 5[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 288[3]; Dugès, La Nat. i. p. 137[4].

Leopardus concolor, Moore, P. Z. S. 1859, p. 51[5].

Mitzli, Hernandez, De Quad. Nov. Hisp. fol. 4, cap. xi.

Leon of Spanish Americans.

Hab. North America, from Canada southwards.—Mexico (*Hernandez*, *Dugès*[4]); Guatemala, Volcan de Agua, Volcan de Fuego, Dueñas (*Godman & Salvin*, *Mus. Brit.*); Honduras, Comayagua (*Leyland*[5]); Costa Rica (*Frantzius*[3]).—South America to Patagonia.

Of all the American Cats the Puma has the widest range, extending over a hundred degrees of latitude, from Patagonia in the south to the Dominion of Canada in the north.

In Central America "el Leon" appears to be plentiful in the wilder parts of the country, especially in the mountain ranges. In Costa Rica Dr. v. Frantzius says it is found in the upper belt of the primæval forests, at an elevation of from 5000–6000 feet, where the hideous sound of its howling is almost continuously heard in the breeding-season[3].

Of the habits and distribution of the Puma in Guatemala, Messrs. Godman and Salvin inform me that it "is common in all the forest-country up to a considerable elevation, being found in the belt of dense forests of the Volcanoes of Agua and Fuego as high as 8000 or 9000 feet. We not unfrequently came across its tracks in this forest. The Indians of Dueñas once brought us a freshly-killed animal, which

* This is not to be confused with the *Felis mexicana* of Desmarest, which is a synonym of *F. yaguarundi*. *Cf.* p. 63.

had been found in the forest a league or two below the village, and run to bay by dogs, which kept it there whilst the Indians fetched their guns and shot it. The Puma has the character of being a cowardly animal, always ready to escape from pursuit; when hard pressed, it climbs a tree out of the reach of the dogs, and thus easily falls a prey to the Indian hunters. It nevertheless is a dangerous neighbour to a cattle-farm, where it makes raids upon the stock."

In Campeachy Dampier says:—"I never did see any Lion in this country; but I have been informed by two or three Persons that they did see Lions here: But I am assured that they are not numerous"*. Pumas, however, were formerly exceedingly plentiful in many parts of Mexico. Professor Baird quotes Clavigero's History of Lower California to the effect that that province was so overrun with "Lions" that the natives were kept in absolute subjection to the brutes, and were often glad to make a meal on the remains of their prey. This increase was owing to a superstition which prevented the Indians from killing a Puma or even disturbing it in any way; and this belief was so fixed in their minds that it long resisted the utmost efforts of the Jesuit Missionaries, who found that they were unable to keep up their stock of domestic animals, owing to the ravages of the wild beasts [2].

5. **Felis yaguarundi.**

Felis yagouaroundi, Desmarest, Mamm. p. 230 (1820, ex Azara)[1].

Felis mexicana, Desmarest, loc. cit. (ex Buffon, nec de Saussure)[2].

Felis yaguarundi, Wagner, Suppl. Schreb. Säugth. ii. p. 41, pl. ciii. B[3]; Baird, Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 12[4]; Tomes, P. Z. S. 1861, p. 287[5]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 278[6].

Leon monero, Leon miquero, of Costa-Ricans[6].

Hab. Mexico (*Buffon*[2]; *Liebmann, Mus. Hafn.*), Tamaulipas (*Berlandier*[4]); Guatemala, Vera Paz, Pacific coast (*Salvin, Mus. Brit.*[5]); Costa Rica, Dota and Candelaria Mountains (*Frantzius*[6]); Panama (*Boucard, Mus. Brit.*).—South America to Paraguay[1].

This singular dark-coloured Cat is a truly Neotropical species, its range extending from Paraguay to the North-eastern States of Mexico. It presents considerable variation in size, and in the ruddy or cinereous tints of its finely annulated fur; but this is neither connected with structural differences nor with geographical distribution, both greyish and reddish animals being found in the same locality.

M. Boucard has received the Yaguarundi from Veragua; but in Costa Rica it is rare and confined to the higher mountain forests; Dr. v. Frantzius could only procure four imperfect skins from the Dota and Candelaria ranges[6]. In Guatemala Mr. Salvin found it on the Pacific coast, as well as in the highlands of Vera Paz. In

* Dampier's Voyages, ii. p. 62.

Mexico Dr. Berlandier considered it very rare, though it was common before the conquest; but he states that it is still somewhat abundant about Victoria, the capital of the State of Tamaulipas, and that it has been killed on the Rio Bravo del Norte, near Matamoras[4]. This appears to be the most northern post of the Yaguarundi, which has not yet been met with beyond the Rio Grande.

6. **Felis eyra.**

Felis eyra, Desmarest, Mamm. p. 231 (1820, ex Azara)[1]; Baird, Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 10, pl. ii. fig. 1[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 278[3].

Apache (common to *Procyon lotor*), *Onza* (common to *Mustela brasiliensis*), of Mexicans[2].

Hab. Mexico, Tamaulipas (*Berlandier, U.S. Nat. Mus.*[2]), Yucatan (*Gaumer, Mus. Boucard*); Costa Rica (*Frantzius*[3]).—South America to Paraguay[1].

The range of this very Weasel-like Cat is the same as that of the Yaguarundi. Like that species it was discovered by Azara in Paraguay, whence it may be traced northwards throughout the greater part of the South-American continent.

North of the Isthmus of Panama the Eyra is very rare. There are no specimens in Mr. Salvin's Guatemalan collections in the British Museum; and in Costa Rica, where it is confined to the wooded mountains of the interior, Dr. v. Frantzius only saw one example during his stay there[3]. Its range extends much further north, however: M. Boucard has received it from Yucatan; and Dr. Berlandier's Mexican collection, now in the United-States National Museum, contains a skull and drawing, of the latter of which Professor Baird has given a reduced copy[2]. In his MS. notes Dr. Berlandier says:—"This animal, by some called *Onza*, by others *Apache*, is extremely rare in Mexico, where I have only seen it in the interior States of the east. In the State of Tamaulipas it is found in the shrubbery which grows on the shores of the Rio Grande del Norte. The specimen which I have described is a female, and was given to me when very young. I tamed it, without its losing altogether the habits of its kind, especially when in sight of some prey. It had attained the size of a (domestic) Cat, but was much more elongate and slender. In every movement it exhibited great lightness and activity, of which we had many proofs"[2].

7. **Felis rufa.**

Felis ruffa, Guldenstädt, Nov. Comm. Petrop. xx. p. 499 (1776, descr. orig.)[1].

Felis rufa, Sclater, P. Z. S. 1871, p. 479[2].

Felis maculata, Horsfield & Vigors, Zool. Journ. iv. p. 381, pl. xiii. (1828, descr. orig.)[3].

Lynx rufus, var. *maculatus*, Baird, Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 13[4]; Allen, Bull. U.S. Geol. Surv. ii. p. 322[5].

Lyncus rufus, Dugès, La Nat. i. p. 137[6].

Ocotochtli seu *Dasipodus*, Hernandez, De Quad. Nov. Hisp. fol. v. cap. xv.

Gato montés of Mexicans[6].

Hab. North America, from New England southwards[5].—Mexico (*Hernandez*; *Baird*[4], *Zool. Soc. Viv.*[2]), Matamoras (*U.S. Nat. Mus.*[5]), Guanajuato (*Dugès*[6]).

The Mexican Lynx was described and figured as a new species by Horsfield and Vigors from a specimen presented to the Zoological Society by Captain Lyon, R.N.[3]; but it has been shown by Professor Baird and subsequent American writers that it cannot be definitely separated from the Bay Lynx of the United States, and that specimens from the north of Texas are intermediate in their characters. Mr. J. A. Allen, who considers that neither form can be specifically separated from the northern *Felis canadensis*, Geoffr., remarks that "the graduation from the 'typical' *rufus* type into *maculatus* is complete and by almost insensible stages"[5]. The principal distinction lies in the shorter and more rufous fur of the southern race, which is also more distinctly spotted. The *maculatus* type extends across the continent from the Rio Grande to Southern California[5]; and it goes at least as far south as Guanajuato, from which State it is recorded by Dr. Dugès[6].

In the Northern States of Mexico the Bay Lynx is abundant. Mr. Schott, of the United-States Boundary Survey, states that "In the Sierras of Pimoria Alta (Sonora) this Lynx seems to be quite common; and as we found traces and specimens of it also on the lower Rio Bravo, we may consider its range going from ocean to ocean." He adds that its "fighting call" is loud and abrupt, and resembles, on a smaller scale, that of the Puma[4].

Fam. II. CANIDÆ.

1. CANIS.

Canis, Linnæus, Syst. Nat. i. p. 56 (1766).

Two species only of the restricted genus *Canis* have been recorded from Central America, and both are identical with well-known Nearctic animals. The first is the Common Wolf of North America, apparently not separable from its European and Asiatic congeners; and the second the Coyote of the western prairies, distinguished by its much smaller size, pointed Fox-like muzzle, fulvous under-fur and more bushy tail.

1. Canis lupus.

Canis lupus, Linnæus, Syst. Nat. i. p. 58 (1766, descr. orig.)[1]; Allen, Bull. Mus. Comp. Zool. p. 154[2]; Bull. U.S. Geol. Surv. ii. p. 313[3].

Canis mexicanus, Linnæus, Syst. Nat. i. p. 60 (1766, ex Hernandez)[4]; Dugès, La Nat. i. p. 137[5].

Canis occidentalis, De Kay, Zool. New York, i. p. 42 (1842, descr. orig.)[6].

Canis occidentalis, var. *mexicanus*, Baird, Mamm. N. Am. p. 113[7]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 14[8].

Xoloitzcuintli, Cuetlachtli, Lupus Mexicanus, Hernandez, Rer. Med. Nov. Hisp. p. 479; De Quad. Nov. Hisp. fol. 7, cap. xxiii.

Lobo of Spanish Americans.

Hab. Palæarctic Region; North America, from Grinnell Land southwards.—Mexico, Sonora (*Kennedy*[8]), Matamoras, Santa Cruz, Saltillo (*U.S. Nat. Mus.*[3]), Guanajuato (*Dugès*[5]).

The Mexican Wolf was described by Linnæus as a distinct species, founded on the *Xoloitzcuintli* of Hernandez[4], and was recognized as a variety of *C. occidentalis* by Professor Baird, who gave as diagnosis:—"Varied with grey and black; neck maned more than usual; a black or dusky band encircling the muzzle; a dusky stripe down the fore leg"[7]. But the labours of later observers, and especially those of Mr. J. A. Allen[2], have conclusively proved that no specific distinctions can be found between the Wolves of various parts of North America, and that no constant characters have yet been pointed out by which they can be separated from the *C. lupus* of Europe and Northern Asia. We have thus the interesting fact of a "circumpolar" species extending its range into the tropics; for the "*Lobo*" of the Mexicans, besides being common in the northern provinces of the Republic, has been found by Dr. Dugès as far south as the State of Guanajuato[5]. As is the case with so many American mammals of a northern type, the southern Wolves are greatly inferior in size to their subarctic brethren; and Mr. Allen has shown that the difference of the length of the skull of a number of North-Mexican and Hudson-Bay examples amounts to no less than twenty-five per cent. of the average size of the whole series[3].

In Northern Mexico the naturalists of the United-States Boundary Survey reported, "Near Santa Cruz, in Sonora, we found this animal more common than we had observed it elsewhere on our route. It, as well as the Coyote, was often destructive to the flocks around the village. It often, too, attacks the young cattle, both domestic and wild, of this region, which are forced to succumb to its great strength"[8].

2. Canis latrans.

Canis latrans, Say, Long's Exped. i. p. 168 (1823, descr. orig.)[1]; Baird, Mamm. N. Am. p. 113[2]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 15[3]; Dugès, La Nat. i. p. 137[4].
Lyciscus latrans, Frantzius, Arch. f. Naturg. xxxv. 1, p. 282[5].
Coyotl seu *Vulpes Indica*, Hernandez, De Quad. Nov. Hisp. fol. iv. cap. xiii.
Coyote of Spanish Americans.

Hab. North America, from about 40° N. lat. southwards.—Mexico (*Hernandez*, *Baird*[3], *Dugès*[4]); Guatemala, San Gerónimo (*Godman & Salvin*); Costa Rica, Guanacaste, Nicoya (*Frantzius*[5]).

The well-known Coyote or Prairie-Wolf of North America was found by the naturalists of the United-States Boundary Survey to be extremely numerous in the northern provinces of Mexico[3]; and Dr. Dugès says it is found in all parts of that Republic[4]. "In Guatemala," Messrs. Godman and Salvin inform me, "the Coyote is an animal

of very local distribution; and, though it is doubtless found in other parts, our experience of it was confined to the hacienda of San Gerónimo in Vera Paz, where it was not at all uncommon. The attraction to this spot was a flock of sheep kept on the hacienda, upon which the Coyotes maintained a constant watch, ever ready to seize a stray animal or one that had not been brought into the fold at night. This fold was a square enclosure surrounded by a wall too high for the Coyotes to climb. Almost any still night one might hear the baying of these animals from the old convent which sheltered us so long and so hospitably." Still further to the southward, the range of the Coyote extends to Costa Rica, where Dr. v. Frantzius tells us that it is now confined to the north-western provinces of Guanacaste and Nicoya; it there inhabits the natural savannas of the south-western slope of the volcanic range, and does great damage about the haciendas, whence it constantly carries off the young calves. Formerly it was found on the Llanos of Turucares, and was sometimes seen in the neighbourhood of Alhajuela; but these formerly pastoral regions are now occupied by agriculturalists, and the Coyotes have consequently withdrawn to the first-named provinces, where they have greatly increased in numbers, in spite of the efforts made to keep them down by the use of strychnine [5].

In Dr. v. Frantzius's opinion it is not improbable that the spread of this Wolf through Central America was subsequent to the Spanish conquest. He considers it improbable that they should have existed among the thick population of the semi-civilized natives who then occupied the western slopes, and thinks that their invasion may have been coincident with that of the European cattle, which were introduced in the first decade of the sixteenth century.

2. VULPES.

Vulpes, Brisson, Règ. An. p. 239 (1755).

The only representative of this genus within our limits is the well-known Grey Fox of North America, easily distinguishable from its Neotropical congeners by the clear grizzled grey of its upper parts, its rufous ears, and its dusky brush, washed beneath with rufous. As will presently be seen, it presents a considerable amount of variation in size, but in coloration it is more constant than most of its family.

1. Vulpes virginianus.

Canis argenteus, Schreber, Säugeth. iii. p. 585 (ante 1777, descr. orig.)[1].
Canis cinereo-argenteus, Schreber, tom. cit. pl. xcii. (ex Brisson)[2].
Canis virginianus, Schreber, tom. cit. p. 585, pl. xcii. B (ex Catesby)[3].
Vulpes (*Urocyon*) *virginianus*, Baird, Mamm. N. Am. p. 138[4]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 16[5]; Allen, Bull. Mus. Comp. Zool. i. p. 160[6].
Vulpes littoralis, Baird, Mamm. N. Am. p. 143 (1857, descr. orig.)[7].

Vulpes cinereo-argentatus, Tomes, P. Z. S. 1861, p. 280[8]; Dugès, La Nat. i. p. 137[9].
Urocyon virginianus, Frantzius, Arch. f. Naturg. xxxv. 1, p. 284[10]; Allen, Bull. U.S. Geol. Surv. ii. p. 320[11].
Oztohua, Hernandez, De Quad. Nov. Hisp. fol. 6, cap. xvi.
Zorro of Mexicans[5].
Tigrillo of Costa-Ricans[10].

Hab. North America, from New England southwards[4].—Mexico (*Deppe*, *Mus. Berol.*), Guanajuato, Guadalajara (*Dugès*[9]), Yucatan (*Gaumer*, *Mus. Boucard*), Merida, Tehuantepec (*U.S. Nat. Mus.*[11]); Guatemala, Dueñas (*Salvin*, *Mus. Brit.*[8]); Honduras (*Dyson*, *Mus. Brit.*); Costa Rica (*Frantzius*[10]).

The Grey Fox, which Professor Baird describes as being generally distributed throughout the United States south of Pennsylvania[4], extends its range through Mexico and Central America. It was found not uncommonly in the north of the former country by the naturalists of the Boundary Survey[5]; Dr. Dugès records it from the States of Guanajuato and Guadalajara[9]; and there are specimens from Yucatan and Tehuantepec in the National Museum at Washington[11]. In Guatemala, Messrs. Godman and Salvin found it to be a very common species, specimens being often obtained by Indian hunters, They once saw one in the forest near Dueñas, which ran along the path in front of them, and then escaped into the bush.

The British Museum contains an example obtained by Dyson in Honduras; and Dr. v. Frantzius states that it is found in Costa Rica, where it is has usurped the name of *Tigrillo*, properly applied to the Tiger-Cats. It there frequents the neighbourhood of human habitations, sheltering itself in clefts of rocks or in holes in stone walls, and is very destructive to poultry. Dr. v. Frantzius found four cubs in such a hole in the month of March; these had a woolly coat, blackish-grey above and whitish below, with greyish-brown markings on the muzzle and feet[10].

In 1857, Professor Baird described a small Grey Fox from the Island of San Miguel as a new species, *Vulpes littoralis*, differing from *V. virginianus* in its much smaller size and softer fur, in its ears not being rusty in colour, and in some minor cranial characters[7]. Mr. Allen, however, after comparison with other specimens, believes the Coast Fox to be merely a local variety of *V. virginianus*, a species which gradually diminishes in size to the southward. A well-matured skull from Yucatan he finds to be even smaller than the Californian examples in the National Museum; and he states that "the small insular race known as '*littoralis*,' from the islands off the coast of Southern California, comes in between the Tehuantepec specimens and the example from Merida"[11]. Another specimen from Yucatan, recently submitted to me by M. Boucard, is somewhat larger than the one described by Mr. Allen, and differs in no respect save size from the usual type of *V. virginianus*.

Fam. III. PROCYONIDÆ.

1. PROCYON.

Procyon, Storr, Prod. Meth. Mamm. p. 35 (1780).

The Raccoons are the only animals of this typically Neotropic family which range well into the Northern continent. They present the most terrestrial development of the family type, having stout compact bodies, a short pointed snout, close-set eyes, broad rounded ears, a somewhat short tail, non-compressed canines, and broad tuberculate molars. The two species whose ranges meet in our subregion are the only ones at present well established, though it seems not improbable that further knowledge will lead to the specific recognition of other South-American forms. At present, however, we have only to deal with :—

1. *P. cancrivorus.* General colour brown ; body and limbs slender, feet sparsely haired or naked above, tail slender, fur close ; outer incisors broad. Length of head and body about 24″, of tail 13″.
2. *P. lotor.* Brownish-grey ; body and limbs stouter, feet fully haired above, tail shorter and more bushy, fur woolly ; incisors small and uniform. Head and body about 24″, tail 11″.

1. Procyon cancrivorus.

Ursus cancrivorus, Cuvier, Tabl. Élém. d'Hist. Nat. p. 113 (1798, descr. orig.) [1].
Procyon cancrivorus, Sclater, P. Z. S. 1875, p. 421 [2].

Hab. Panama, Veragua (*Mus. Boucard*), Colon (*Ridpath, Zool. Soc. Viv.*[2]).—South America, to Guiana [2].

The Crab-eating Raccoon is found as far north as Panama, whence living specimens have more than once been received by the Zoological Society, and Veragua, whence it has been obtained by M. Boucard. It is a native of Colombia and Guiana : but its range further south is doubtful ; for Mr. Sclater has shown good reason to believe that the Raccoon of Southern Brazil and Paraguay belongs to another form, which may probably prove to constitute a distinct species. This latter race is distinguished by its naked reddish feet and by the yellow colour of the lower part of its body ; for in the northern animal the feet are dark and more fully haired above, and the belly is but slightly paler than the back. Further information will be required before the relationship of these two forms can be definitely settled. Should they prove distinct, Cuvier's name, being founded on Cayenne specimens, must be retained for the northern race [2].

2. Procyon lotor.

Ursus lotor, Linnæus, Syst. Nat. i. p. 70 (1766, descr. orig.)[1].
Procyon lotor, Allen, Bull. U.S. Geol. Surv. ii. p. 325[2].
Procyon lotor, var., Is. Geoffroy, Zool. Voy. Vénus, p. 125, pl. vi.[3]
Procyon hernandezii, Wagler, Isis, 1831, p. 514 (descr. orig.)[4]; Baird, Mamm. N. Am. p. 212[5]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 22[6]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 291[7].
Procyon hernandezii, var. *mexicana*, Baird, Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 22[8]; Dugès, La Nat. i. p. 137[9].
Procyon nivea, Gray, Mag. Nat. Hist. i. p. 580 (1857, descr. orig.)[10].
Procyon psora, Gray, Ann. & Mag. Nat. Hist. x. p. 261 (1842, descr. orig.)[11]; Zool. Voy. 'Sulphur,' p. 32, pls. xi., xvii.[12]
Mapach quauh-pecotli, Hernandez, De Quad. Nov. Hisp. fol. 1, cap. i.
Mapachin of Costa-Ricans[7].
Tejon solitario (common to *Nasua nasica*)[9], *Apache* (common to *Felis eyra*)[6] of Mexicans.

Hab. North America, from Alaska southwards[2].—Mexico, Sonora (*Kennerly*[8]), Guanajuato, Guadalajara (*Dugès*[9]), Mazatlan (*Geoffroy*[3]; *Liebmann, Mus. Hafn.*), Mirador, Colima, Tehuantepec (*U.S. Nat. Mus.*[2]); Guatemala (*Godman & Salvin, Mus. Brit.*); Costa Rica (*Frantzius*[7]; *U.S. Nat. Mus.*[2]).

The southern race of the Common Raccoon was separated by Wagler as *P. hernandezii*[4], and has since been made the basis of other nominal species; but the investigations of recent American zoologists, and especially those of Mr. J. A. Allen[2], have clearly shown that the characters which have been relied on as specific are quite untrustworthy. The range of the Common Raccoon therefore extends throughout Northern and Central America from Alaska in the north-west to Costa Rica, where it was found by Dr. v. Frantzius[7], and whence there are specimens in the National Museum at Washington[2]. Throughout this extensive range the species presents considerable variation in colour, and a marked increase in size towards the southward; but Mr. Allen, after the examination of the large series of specimens at Washington, is doubtful whether these variations can be regarded as of even "subspecific" value[2].

American writers have given full details of the habits of the Raccoon as observed in the United States; and according to Drs. Berlandier, Kennerly[6], and von Frantzius[7], its manner of life in Central America is quite similar.

2. BASSARICYON.

Bassaricyon, Allen, Proc. Ac. Philad. 1876, p. 20.

The second genus of the Procyonidæ is only known at present by Mr. Allen's description and figures of its cranial characters. These were taken from the still unique type, a skull obtained by Professor Gabb in Costa Rica, the skin of the specimen having most unfortunately been mislaid in the National Museum at Washington.

According to Mr. Allen, the skull of *Bassaricyon* presents considerable differences from those of *Procyon*, *Nasua*, and *Bassaris*, but shows most affinity with the two former genera. One of its most important characters is in the form of the auditory bullæ, which converge behind, instead of in front as in most other Carnivores. Another is the manner in which the anterior root of the zygoma "expands abruptly outward in a nearly horizontal plane from the alveolar border of the maxilla, thus forming a nearly horizontal triangular expansion beneath the orbit—a feature not possessed by any of its nearest affines, and only approximated in *Bassaris* and in the Cats." The general profile of the skull resembles that of *Procyon*; but the orbits are very large, the postorbital processes strongly marked, the temporal ridges widely separated, the bony palate flat, the front edge of the coronoid process nearly straight, and the angular portion of the mandible little developed.

Zoologists can only look forward with impatience for further information as to this interesting form, which Mr. Allen believes will prove worthy to rank as the type of a new subfamily, the *Bassaricyoninæ*.

1. Bassaricyon gabbi.

Bassaricyon gabbii, Allen, Proc. Ac. Philad. 1876, p. 23, pl. i. (descr. orig.)[1] [nec Allen, op. cit. 1877, p. 267, pl. ii.[2]; cf. Bull. U.S. Geol. Surv. v. p. 169[3]].

Hab. Costa Rica (*Gabb, U.S. Nat. Mus.*[1]).

As observed above, the external characters of this animal are still quite unknown. The skull shows that in size it is probably inferior to either of the species of *Bassaris*; and "the large size and position of the orbits, and the large bullæ, seem to indicate an animal of nocturnal habits. It is also evidently rather rare, or very difficult to obtain; for Professor Gabb's collection, which embraces very large series of the more common species, contains but a single example of this"[1].

By an accidental error, which must have been most annoying to so careful a zoologist, Mr. Allen was misled into supposing that a specimen of *Nasua nasica*, sent to him from the Washington Museum, was the lost skin corresponding to his typical skull, and, not being then familiar with the Central-American Coati, he consequently described and figured it as *Bassaricyon gabbi*[2]. He has since pointed out the mistake in his recent review of the genus *Nasua*[3].

3. BASSARIS.

Bassaris, Lichtenstein, Abh. Ak. Berl. 1827, p. 119; Isis, 1831, p. 423 (sine descr., ex Hernandez); Wagler, tom. cit. p. 513 (descr. orig.).

This curious Central-American type was long referred to the Viverridæ, of which family it was supposed to be the only American representative. Mr. Waterhouse

seems to have been the first to remove it to the Procyonidæ*; but it is to Professor Flower that we owe a full account of its anatomy, which places its systematic position beyond question †.

In outward form the Cacomistles resemble *Nasua* rather than *Procyon*, but in cranial characters they agree most closely with the latter. The skull may, however, be always distinguished from that of the Raccoon by the more slender nasal portion, the larger postorbital processes, and above all by the bony palate not being produced beyond the last molars. Two species have been well established, which differ as follows, as well as in minor cranial and dental characters:—

1. *B. astuta.* Pale rufous-grey; tail white, with seven or eight black rings interrupted below, shorter than head and body. Soles hairy; incisors smooth in front.
2. *B. sumichrasti.* Darker; tail grey, with black rings more complete and broader, especially towards the tip, longer than head and body. Ears broader. Soles naked in front; incisors grooved in front.

1. Bassaris astuta.

Bassaris astuta, Lichtenstein, Abh. Ak. Berl. 1827, p. 119 (sine descr.)[1]; Wagler, Isis, 1831, p. 513 (descr. orig.)[2]; Lichtenstein, Darst. neu. Säugeth. pl. xliii.[3]; Charlesworth, P. Z. S. 1841, p. 60[4]; Baird, Mamm. N. Am. p. 147[5]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 18[6]; Dugès, La Nat. i. p. 137[7]; Allen, Bull. U.S. Geol. Surv. v. p. 336[8].

Bassaris raptor, Baird, Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 19 (1859, descr. orig.)[9].

Tepe-Maxtlaton, Cacamiztli, Hernandez, De Quad. Nov. Hisp. fol. 9, cap. xxviii; fol. 12, cap. xl.

Cacomistle of Mexicans[7].

Cat-Squirrel of Texans[6].

Hab. North America, from Oregon and Ohio southwards[8].—Mexico (*Deppe*, *Mus. Berol.*[1]), Guanajuato (*Dugès*[7]), City of Mexico (*Charlesworth*, *Mus. Brit.*[4]), Orizaba, San Luis Potosi, Sierra Santiago (*U.S. Nat. Mus.*[8]).

This animal was first systematically named in Lichtenstein's review of Hernandez[1]; but the earliest published description appears to have been that given by Wagler[2]. The animal is now well known, and is found to have a more extended range than was formerly supposed: it is found, though rarely, as far north as Oregon and Ohio, is plentiful in Texas, California, and Northern Mexico, and goes at least as far south as the State of Vera Cruz, whence there are specimens in the National Museum at Washington[8]. In the hotter parts of Mexico it gives place to the next species; but as the latter has only recently been discriminated, much still remains to be learned as to their local distribution. According to Mr. Allen the Californian example for which Professor Baird proposed the provisional name of *B. raptor*[9] is referable to this species and not, as has been generally supposed, to the next.

* P. Z. S. 1839, p. 137 (footnote). † P. Z. S. 1869, pp. 31–34.

The Common Bassaris still bears the Mexican name of *Cacomistle*, or *Cacamiztli*, under which it was first noticed by Hernandez. Living naturally among rocks and in forests, it often takes up its abode close to mankind, and is even stated by Mr. Charlesworth to be abundant in the City of Mexico itself, where it frequents outhouses and uninhabited buildings, and commits nightly ravages among pigeons and poultry [4]. The naturalists of the United-States Mexican-Boundary Survey record that on shooting a female they found four or five young ones so firmly attached to her nipples that they were removed with some difficulty after the mother had been dead for several hours [6].

2. **Bassaris sumichrasti.** (*Bassaris raptor*, Tab. VI.)

Bassaris sumichrasti, de Saussure, Rev. et Mag. Zool. 1860, p. 7, pl. i. (descr. orig.) [1]; Allen, Bull. U.S. Geol. Surv. v. p. 338 [2].
Bassaris variabilis, Peters, Monatsb. Ak. Berl. 1874, p. 704, pls. i. & ii. (descr. orig.) [3].
Bassaris monticola, Cordero, La Nat. iii. p. 269 (1875, descr. orig.) [4].
Tepechiche del Cofre de Perote, Cacomistle de Monte of Mexicans [4].
Muyus of Guatemalans.

Hab. Mexico, warmer regions (*de Saussure* [1]), Jalapa (*Cordero* [4]), Mirador, Tehuantepec (*U.S. Nat. Mus.* [2]); Guatemala, Volcan de Fuego (*Godman & Salvin, Mus. Brit.*), Coban (*Mus. Berol.* [3]); Costa Rica, Volcan de Cartago (*Arcé, Mus. Brit.*), La Palma *U.S. Nat. Mus.* [2]).

Although the Southern *Bassaris* has only been known to science for twenty years, its synonymy has already become involved in confusion, which has unfortunately caused our plate to be wrongly lettered. In describing his *Bassaris variabilis* from Guatemala [3], Professor Peters doubtfully referred the *B. sumichrasti* of M. de Saussure [1] to the *B. raptor* of Professor Baird; and as the descriptions of all three writers appeared to me to indicate that they had the same animal before them, I was led to adopt the latter as the oldest title. But, as mentioned above, Mr. Allen has lately announced that Professor Baird's type specimens prove, on re-examination, to belong to the last species [2]. M. de Saussure's name must consequently be retained; and I do not think that there can be any doubt that the *B. variabilis* of Professor Peters and the *B. monticola* of Señor Cordero [4] must be regarded as synonyms, the characters by which they have been defined not proving constant when a series of specimens are compared.

The Southern Cacomistle seems to frequent the forest-clad mountains of the warmer parts of Mexico and Central America, its range extending as far south as Costa Rica; for though Dr. v. Frantzius does not appear to have met with it in that country, two specimens have been sent by Arcé to the British Museum from the Volcan de Cartago, and the United-States National Museum has received it from La Palma. In Guatemala, where it is called *Muyus*, Messrs. Salvin and Godman write to me that "several specimens of this *Bassaris* were obtained for us by Indian hunters in the forests of the Volcan de Fuego. They are found and brought to bay by dogs, and then easily shot.

None of the hitherto published figures of this animal being satisfactory, we have had the accompanying plate drawn from one of these Guatemalan specimens now in the British Museum.

4. NASUA.

Nasua, Storr, Prod. Meth. Mamm. p. 35 (1780).
Caoti, Lacépède, Mém. de l'Inst. Nat. iii. p. 492 (1801).

The Coatis differ from the genera already considered in their greatly elongated and very mobile snouts, in the consequently produced and narrowed form of the facial portion of the skull, and in the reduction of the coronoid process of the mandible to an obtuse angle, as well as in their strongly compressed canines and narrower molars.

The variation of colour in this genus is extremely great; and consequently several species have been described, all of which have been reunited by some zoologists. Dr. Hensel, however, has clearly shown that two perfectly distinct species exist, differing constantly in coloration and in structural characters, and having a different geographical distribution *; and both Mr. J. A. Allen and I have independently come to the conclusion that these two species are identical with the *Viverra narica* and *V. nasua* of Linnæus, well characterized by him, but long involved in confusion by subsequent writers. Only the former is found north of the Isthmus of Panama; and I may refer the reader to Mr. Allen's excellent paper † for a full description and synonymy of the southern species, for which the proper title appears to be *Nasua rufa*, Desmarest. From it the Central-American *N. nasica* is distinguishable by its white nose and upper lip, its almost concolorous back and tail (in the latter of which annulations are either totally absent or obscurely marked on the lower surface only), by its shorter ears and softer fur, and by the marked depression of the posterior portion of the bony palate.

1. **Nasua nasica** ‡.

Viverra narica, Linnæus, Syst. Nat. i. p. 64 (1766, ex Brisson)[1].
Nasua narica, Allen, Bull. U.S. Geol. Surv. v. p. 162[2].
Nasua leucorhynchus, Tschudi, Faun. Peru. p. 100 (1846, descr. orig.)[3]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 292[4]; Dugès, La Nat. i. p. 137[5]; Hensel, Abh. Ak. Berl. 1872, p. 65[6].
Nasua fusca, Tomes, P. Z. S. 1861, p. 280 (nec Desmarest)[7].
Nasua solitaria, var. *mexicana,* Weinland, Zoolog. Gart. 1860, p. 191, pl. i. (nec Max. zu Wied)[8].
Nasua socialis et *solitaria,* de Saussure, op. cit. 1862, pp. 52–56 (nec Max. zu Wied)[9].

* Abh. Ak. Berl. 1872, pp. 65, 66. † Bull. U. S. Geol. Surv. v. pp. 153–174.

‡ Opinions have differed as to whether the Linnæan name *narica* was intended to be a derivative from *naris,* or was a misprint for *nasica.* My friend Mr. H. T. Wharton has kindly investigated this point; and he tells me that the only classical adjective derived from *naris,* which he can find, is *narinosus,* which, in a doubtful passage in Lactantius, means "with a *broad* nose." *Nasica,* on the other hand, "with a *long* or *pointed* nose," is a common adjective, and was a well-known surname in the Scipio family. As Linnæus founded his species on the "*Ursus naso producto et mobili, caudâ unicolore*" of Brisson (Reg. An. p. 262), it seems almost certain that he meant to write *nasica.*

Quauh pecotl seu *Meles Montanus*, Hernandez, De Quad. Nov. Hisp. fol. 6, cap. xvii.
Pisoti, Tejon, of Spanish Americans (the latter name being common to *Procyon*).

Hab. North America, Texas[2].—Mexico (*Liebmann, Hegewitsch, Mus. Hafn.*), Mazatlan, Colima, Tehuantepec, Jalapa (*U.S. Nat. Mus.*; *Mus. Comp. Zool.*[2]), Vera Cruz (*Weinland*[8], *de Saussure*[9]), Guadalajara (*Dugès*[5]), Yucatan (*Gaumer, Mus. Boucard*); British Honduras, Belize (*Mus. Comp. Zool.*[2]); Guatemala, Dueñas[7], Volcan de Fuego (*Godman & Salvin, Mus. Brit.*); Nicaragua (*Belt*); Costa Rica (*Frantzius*[4]), Tucurrique (*Arcé, Mus. Brit.*), Pacuare, Talamanca, Las Cruces de Candelaria (*U.S. Nat. Mus.*[2]); Panama (*Boucard, Mus. Brit.*).

The White-nosed Coati seems to be widely distributed throughout Central America, passing in the north into Texas, whence a specimen was sent from Fort Brown to the National Museum at Washington[2]. Southwards its range may not improbably extend into Colombia; but neither Mr. Allen nor I have ever seen a single specimen of true *N. nasica* from any locality further south than Panama. Owing to Tschudi's description of his *N. leucorhynchus* having appeared in his great 'Fauna of Peru,' it has been assumed by some that the animal is a native of that country; but his types were Museum specimens, stated to be from "the interior of Brazil"[3]; and there seems to be little doubt that that somewhat vague habitat was erroneous.

As in Brazil, the natives of Central America distinguish two species of Coati—the sociable (*Tejon de mannada*) and the solitary (*Tejon solo*). This distinction was recognized by Prince Maximilian and by several later zoologists; and we are indebted to Dr. Hensel[6] for the confirmation of Azara's opinion that the *Pisoti solo* is simply an old male which has left the herd and adopted a hermit-life.

In Costa Rica Dr. v. Frantzius found this species in the mountain-forests lying at an elevation of from 6000 to 7000 feet above the sea, and obtained specimens from the summit of the Irazu and the Poas volcanoes, from Turialba and the Candelaria Mountains[4]. Mr. Belt states that in Nicaragua he observed the Coati pursuing the large Iguanas, but that the lizards usually manage to drop from the branch and escape to another tree, except when they are surprised asleep. He says*:—"I once saw a solitary Pisoti hunting for Iguanas among some bushes near the lake, where they were very numerous; but during the quarter of an hour that I watched him he never caught one. It was like the game of 'puss in the corner.' He would ascend a small tree on which there were several; but down they would drop when he had nearly reached them, and rush off to another tree. Master Pisoti, however, seemed to take all his disappointments with the greatest coolness, and continued the pursuit unflaggingly. Doubtless experience had taught him that his perseverance would ultimately be rewarded, that sooner or later he would surprise a corpulent Iguana fast asleep on some branch or too late in dropping from his resting-place. In the forest I always saw the Pisoti hunting in large bands, from which an Iguana would

* 'Naturalist in Nicaragua,' p. 339.

have small chance of escape; for some were searching along the ground, whilst others ranged over the branches of the trees."

Messrs. Godman and Salvin tell me that "the Pisoti is one of the commonest animals in Guatemala, being found in forests at elevations ranging from 8000 and 9000 feet to the lowland woods of the coast-region. Specimens were often brought to us by Indian hunters, who caught them in the neighbourhood of Dueñas, either in the forests of the volcano or on the slopes of the mountains at a lower level. It is an animal easily tamed, and one very often seen in Spanish houses, chained to one of the pillars of the corridor surrounding the courtyard."

Dr. Weinland first drew the attention of European zoologists to the existence in Mexico of a *Nasua* which had been overlooked since Hernandez's day, and which he described as a variety of the Brazilian *N. solitaria* (=*N. rufa*)[8]. M. de Saussure added further observations, following Prince Maximilian's specific distinction of the *Tejon de mannada* and *Tejon solo*[9]. Since then, as will be seen from our list of localities, Coatis have been collected in many parts of Mexico, especially by the energetic agents of the Smithsonian Institution.

5. CERCOLEPTES.

Potos, Cuvier, Leçons d'Anat. Comp., i. 1r Tabl. (1800)*.
Kinkajou, Lacépède, Mém. de l'Inst. Nat. iii. p. 492 (1801)*.
Cercoleptes, Illiger, Prod. Syst. Mamm. p. 127 (1811).

The only known species of this genus † was formerly sometimes placed among the Insectivores, or even with the Lemurs, till Professor Owen's description of its anatomy‡ placed its natural affinities beyond doubt. Its form is still more elongated than that of the Cacomistle or the Coati; the head is rounded, the muzzle pointed, the tongue extensile, and the tail long and strongly prehensile. The compression of the canines is still more marked than in *Nasua*, and there is a premolar less above and below than in the other genera of the family.

1. **Cercoleptes caudivolvulus.**

Viverra caudivolvula, Pallas, in Schreber's Säugth. iii. p. 453, pl. cxxv. B (antè 1777, descr. orig.)[1].
Cercoleptes caudivolvulus, Tomes, P. Z. S. 1861, p. 280[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 291[3]; Dugès, La Nat. i. p. 137[4].
Martica of Mexicans[4].
Micoleon of Guatemalans.
Martilla of Costa-Ricans[4].

Hab. MEXICO (*Liebmann, Mus. Hafn.*), near City of Mexico (*Dugès*[4]); GUATEMALA,

* Both these barbarous names are fortunately insufficiently characterized (see footnote to page 3).

† The separation of Martin's *C. megalotus* and *C. brachyotus* (P. Z. S. 1836, p. 83) appears, to use Gray's words, to have depended only on the artifice of the preserver. ‡ P. Z. S. 1835, pp. 119–124.

Dueñas[2], Lanquin (*Godman & Salvin, Mus. Brit.*); Costa Rica (*Frantzius*), Tucurrique (*Arcé, Mus. Brit.*).—South America to the Rio Negro and Peru.

The Kinkajou is a native of the northern part of the Neotropical Region, finding its southern boundary on the Rio Negro of Brazil, according to Humboldt, and in the northern provinces of Peru, where it was obtained by Tschudi. In Central America it appears to be found from the Central States of Mexico southwards. Messrs. Godman and Salvin remark that, "although by no means rare in Guatemala, the *Micoleon* is not often seen. One we met with was feeding on fruit in a tree overhanging the river of Lanquin in Vera Paz, and, being wounded, swam the stream without difficulty, but was secured by an Indian who plunged in in pursuit. It is an animal easily tamed, living in captivity on oranges and bananas, which it eats with great avidity. Our specimens were obtained at various altitudes up to 4000 or 5000 feet."

Two centuries ago the Kinkajou was similarly tamed in Central America, as appears from Dampier's quaint account of the "Squash," which he thus describes:—"The Squash is a four-footed Beast, bigger than a Cat: Its Head is much like a Foxes, with short Ears and a long Nose. It has pretty short Legs, and sharp Claws, by which it will run up Trees like a Cat. The Skin is covered with short fine yellowish Hair. The Flesh of it is good, sweet, wholesome meat. We commonly skin and roast it; and then we call it Pig; and I think it eats as well. It feeds on nothing but good Fruit; therefore we find them most among the Sapadillo-Trees; This Creature never rambles very far: and being taken young, will become as tame as a Dog, and be as roguish as a Monkey" *.

In Costa Rica, where it is termed *Martilla* or Little Marten, Dr. v. Frantzius tells us that the Kinkajou is not uncommonly to be found in holes in trees, where it lies concealed during the day, issuing forth at night in pursuit of small mammals and birds. Its fur is much valued; and skins are often brought to market, but always in an imperfect state[3].

Fam. IV. MUSTELIDÆ.

1. MUSTELA.

Mustela, Linnæus, Syst. Nat. i. p. 66 (1776).

In America the restricted genus *Mustela* is essentially a Nearctic type; but one species, at least, ranges far into the southern continent. The characters of the genus are too well known to require repetition; and it will be sufficient here to state my reasons for retaining the Linnæan name for the present group, instead of *Putorius*, which is most in favour with American writers. The latter word is not used by Cuvier binomially, but merely to mark a *sous-genre*†; and Nilsson, who appears to have been the first

* Dampier's 'Voyages,' ii. p. 59.

† 'Règne Animal,' i. p. 147 (1817).

systematist who separated the Martens from the Weasels *as genera*, retained the term *Mustela* for the latter and used *Martes* (ex Gesner) for the former*. By both law and custom we are therefore bound to apply the Linnæan title to the most typical division of his genus, to which it was assigned by its first separator, and to which it has been confined by most recent writers.

Our only Central-American Weasel may be distinguished from its northern allies *M. erminea*, Linn., and *M. longicaudata*, Bonap., by the top of its head being darker than the back, the chin white, and the other lower parts orange-yellow or even salmon-coloured. The face may or may not present irregular white markings.

1. Mustela brasiliensis.

Mustela brasiliensis, Sewastonoff, Mém. Ac. Pétersb. iv. p. 356, pl. iv. (1813, descr. orig.)[1].
Mustela frenata, Lichtenstein, Darst. neu. Säugeth. pl. xlii. (1834, descr. orig.)[2]; Tomes, P. Z. S. 1861, p. 287[3]; Dugès, La Nat. i. p. 137[4].
Mustela xanthogenys, Gray, Ann. & Mag. Nat. Hist. xi. p. 118 (1843, descr. orig.)[5]; Voy. 'Sulphur,' p. 31, pl. ix.[6]
Mustela noveboracensis, Frantzius, Arch. f. Naturg. xxxv. 1, p. 286 (nec De Kay)[7].
Putorius frenatus, Baird, Mamm. N. Am. p. 178[8]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 19[9].
Putorius brasiliensis, Coues, Fur-bearing Animals, p. 142[10].
Onza (common to *Felis eyra*), *Uronzito*, *Onzito* of Mexicans[9].
Collareja of Costa-Ricans[7].
Comadreja of Spanish Americans generally[2].

Hab. North America, from Oregon (?) southwards[10].—Mexico (*Deppe*, *Mus. Berol.*; *Charlesworth*, *Mus. Brit.*), Tamaulipas, Matamoras (*Berlandier*[10]), Guanajuato, Mexico (*Dugès*[4]), Yucatan, Chochola (*Gaumer*, *Mus. Boucard*); Guatemala, Dueñas (*Salvin*, *Mus. Brit.*[3]); Costa Rica (*Frantzius*[7]; *Whitely*, *Mus. Brit.*); Panama (*Boucard*, *Mus. Berol.*).—South America, to Brazil[10].

An examination of a large series of specimens has convinced me that the systematic names quoted above are merely synonyms of a single variable species; and it seems probable that *Mustela agilis*†, *M. affinis*‡, *M. aureoventris*§, and *M. macrura*¶ will also prove to be the same. According to this view, in which Dr. Elliott Coues concurs in his recent monograph[10], only a single species of *Mustela* has yet been established as a native of the Neotropical Region.

The range of the Bridled Weasel is stated by the zoologist just named to extend northward to Fort Crook in California, if not to Astoria in Oregon, thus overlapping that

* 'Skandinavisk Fauna,' i. p. 41 (1820). The genus *Martes* has been quoted by Lilljeborg and some others as having been instituted by "G. Cuvier, 1797." This error appears to have originated in a misunderstanding of the French plural "Martes" in the 'Tableau Elémentaire.' *Cf.* P. Z. S. 1879, p. 468.

† Tschudi, Faun. Peru. p. 110.

‡ Gray, Ann. & Mag. Nat. Hist. xiv. p. 373.

§ Gray, P. Z. S. 1864, p. 55.

¶ Taczanowski, P. Z. S. 1874, p. 311, pl. xlviii.

of its close ally, *M. erminea*, Linn. Here the animal is of the comparatively pale form named *M. xanthogenys* by Gray[5], "which is merely the northernmost palest form, between which and true *frenata* (City of Mexico &c.) there is no difference requiring recognition by name. In Guatemala *frenata* already assumes the rich coloration that culminates further south in *brasiliensis*" [10]. In the dark southern races there is a tendency to the disappearance of the irregular white facial markings; but this is a point in which there is much individual variation. Thus in three examples collected in Costa Rica by Dr. v. Frantzius the frontal spots were totally absent[7], while in a specimen sent from the same country by Whitely to the British Museum they are of the usual size. The tints of the lower parts vary, as well as those of the upper, but are brighter salmon-red in the young than in the adult. As in the allied species, there is also considerable variation in the proportional length of the tail and body.

In habits the Bridled Weasel probably resembles its northern congeners, but nothing appears to have been specially recorded as to its mode of life.

2. GALICTIS.

Galictis, Bell, Zool. Journ. ii. p. 552 (1826) *.
Galera et *Grisonia*, Gray, List Mamm. Brit. Mus. pp. 67, 68 (1843).

This genus, of which only two species are known, resembles the true Weasels in dentition and the Martens in general form and habits, but differs from both in its closely connected digits, naked soles, and almost plantigrade gait. Both the Grison, *G. vittata* (Schreb.), and the Tayra have a wide distribution in South America; but the latter only, well characterized by its black-brown colour with irregular light markings about the face and throat, extends its range north of the Isthmus of Panama†.

1. Galictis barbara.

Mustela barbara, Linnæus, Syst. Nat. i. p. 67 (1766, descr. orig.)[1].
Galera barbara, Moore, P. Z. S. 1859, p. 51[2].
Galictis barbara, Frantzius, Arch. f. Naturg. xxxv. 1, p. 287[3].
Tepeytzcuitli seu *Canis Montanus*, Hernandez, De Quad. Nov. Hisp. fol. 7, cap. xxi.
Chulomuco, Tulomuco, of Costa-Ricans[3].

Hab. Mexico (*Mus. Brit.*), Yucatan (*Gaumer, Mus. Boucard*); British Honduras, Belize (*Leyland*[2]); Nicaragua, Granada (*Œrsted, Mus. Hafn.*); Costa Rica (*Frantzius*[3]); Panama (*Zool. Soc. Viv.*).—South America, to the Rio de la Plata.

* Not *Galictis* of Is. Geoffroy (Compt. Rend. Ac. Paris, v. p. 581, 1837), which is the same as his *Galidictis* (Mag. de Zool. 1839, p. 51).

† Two fossil species from postpliocene deposits of Maryland and Virginia have been described by Prof. Cope under the names *Galera macrodon* and *G. perdicida* (Proc. Philad. Ac. 1868, p. 155; Proc. Am. Philos. Soc. 1869, p. 177); but (with regard to the latter, at least) there seems to be some doubt whether the remains were not those of a *Mephitis*. (*Cf.* Coues, Fur-bearing Animals, pp. 19, 20.)

The Tayra seems to be widely but locally distributed throughout Central America. The Zoological Society have received it from Panama; and Dr. v. Frantzius saw a few skins in Costa Rica which were remarkably black in colour with a yellow breast-spot [3]. According to Tschudi the Tayra of Peru shows a similar intensity of coloration; but this is a point in which the species varies greatly. Thus a half-grown Nicaraguan example in the Copenhagen Museum is entirely of a uniform dark brown, while two Mexican specimens of about the same age in the British Museum have the head and shoulders almost pure white, the white patch on the breast being defined in front by an indistinct V-shaped dark line. This style of coloration, which agrees with Hernandez's description of the *Tepeytzcuitli*, appears to prevail in Mexico; two Yucatan examples in M. Boucard's collection are very black, with pale grey heads and napes and small triangular white breast-spots. Messrs. Godman and Salvin did not obtain the Tayra in Guatemala; but Mr. Leyland found it in British Honduras, living in troops of from fifteen to twenty among the pine-ridges of Belize [2].

3. MEPHITIS.

Mephitis, Cuvier, Leçons d'Anat. Comp. i. 1re Tabl. (1800).

The Skunks, animals of unenviable notoriety, are exclusively a New-World group. They agree closely in general appearance and in essential structure, but are divisible into two well-marked genera, of which the first, *Mephitis* proper, is Nearctic, and the second, *Conepatus*, is Neotropical in distribution. These two types meet in Central America.

The Skunks of the restricted genus *Mephitis* have three premolars above and below, a pointed muzzle, lateral nostrils, narrow feet, with partially clad soles, and a long and bushy tail. They present an extraordinary amount of variation, not only in coloration but in size and even in osteological characters; and this variation has led to the description of a number of species. Of these, Dr. Elliott Coues and Mr. J. A. Allen consider that only two or three are valid; and their opinion is of great weight, as the material at their disposal is much greater than that enjoyed by European zoologists. A comparison of all the specimens to which I have access leads me fully to indorse their views, and to agree with Dr. Coues in recognizing only the three following species:—

1. *M. mephitica.* Black; nape white; two dorsal white stripes often fused in front. Tail *with* hair, shorter or little longer than head and body.
2. *M. macrura.* Black; a broad hoary dorsal band (long hairs white, fur grey), and two narrow lateral white stripes. Tail *without* hair, as long as head and body.
3. *M. putorius.* Black, marked with numerous spots and narrow interrupted white stripes. Tail shorter than the body only.

Full details of the external and osteological characters of these species will be found in Dr. Coues's 'Fur-bearing Animals,' where are also quoted the observations of Dr. Wyman, Dr. Warren, and M. Chatin on the anatomy and physiology of the anal glands and secretion which have made the name of Skunk a by-word.

1. Mephitis mephitica.

Viverra mephitis, Schreber, Säugth. iii. p. 444, pl. cxxi. (1778, ex Linnæus, ed. x.)[1].
Viverra mephitica, Shaw, Mus. Lever. p. 171 (1792)[2].
Mephitis mephitica, Baird, Mamm. N. Am. p. 195[3]; Allen, Bull. Mus. Comp. Zool. i. p. 178[4]; Coues, Bull. U.S. Geol. Surv. 2nd ser. no. 1[5]; Fur-bearing Anim. p. 195[6].
Mephitis vittata, Lichtenstein, Darst. neu. Säugeth. pl. xlvii. (1834, descr. orig.)[7]; Abh. Ak. Berl. 1836, p. 278[8]; Baird, Mamm. N. Am. p. 200[9].
Mephitis mesomelas, Lichtenstein, Darst. neu. Säugeth. pl. lv. fig. 2 (1834, descr. orig.)[10]; Baird, Mamm. N. Am. p. 199[11].
Mephitis varians, Gray, Mag. Nat. Hist. i. p. 581 (1837, descr. orig.)[12]; Baird, Mamm. N. Am. p. 193[13]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 19[14].
? *Mephitis bicolor*, Dugès, La Nat. i. p. 137 (nec Gray)[15].
Zorrillo of Guatemalans.

Hab. North America, from Hudson Bay southwards[6].—Mexico (*Sallé*, *Mus. Brit.*), Matamoras (*Couch*[14]), San Mateo (*Deppe*, *Mus. Berol.*[7]), Oaxaca (*Deppe*, *Mus. Brit.*), Guanajuato? (*Dugès*[15]); Guatemala (*Godman & Salvin*).

The observations of American zoologists have shown the enormous amount of variation in colour to which the Common Skunk is liable, not only in individuals inhabiting the same locality, but even, as witnessed by Audubon and by Mr. Allen[4], in members of the same litter. Dr. Coues remarks that there is a tendency to an increase of white in the markings of Skunks from the eastern and middle States of the Union, while it is reduced to a minimum in those of the Gulf States[6]. In the Mexican specimens on which Lichtenstein founded his *M. vittata*[7] the white dorsal stripes are narrow and interrupted in front; but no two specimens that I have seen are exactly alike, and I have no hesitation in regarding it merely as a dark form of *M. mephitica*. Dr. Coues appears to think that *M. vittata* might be the same as *M. macrura*[6]; but in this he has probably been misled by Lichtenstein's figure, in which the tail is represented much too long. In one of the specimens in the British Museum the lateral stripes are almost obsolete. In a drawing by Mrs. Salvin of a specimen in the Museum of Guatemala the white stripes are broad, and there appears to be no frontal stripe or nuchal area of that colour. This sketch is the only positive evidence which I have hitherto been able to obtain of the extension of the range of *M. mephitica* into Guatemala, where it is probably not so common as *Conepatus mapurito*. It is not represented in Messrs. Godman and Salvin's collections; and the following notes, supplied to

me by these gentlemen, may apply in part to the southern form:—"Skunks," they inform me, "are found throughout Guatemala; and few country houses, where old stone walls or fences abound, are not infested by these beautiful but nauseous animals. They are seldom seen, being nocturnal in their habits; but not unfrequently, during the night, one is awakened by a clamour of dogs, which is soon followed by the air being tainted with the foul odour which makes the Skunk so notorious.

"These animals are preyed upon by Hawks and Owls, and we have not unfrequently shot specimens of these birds whose plumage reeked of the odour of a Skunk."

2. **Mephitis macrura.**

Mephitis macrura, Lichtenstein, Darst. neu. Säugeth. pl. lxvi. (1834, descr. orig.)[1]; Abh. Ak. Berl. 1836, p. 277[2]; Baird, Mamm. N. Am. p. 200[3]; Dugès, La Nat. i. p. 137[4]; Coues, Fur-bearing Anim. p. 236[5].

Mephitis mexicana, Gray, Mag. Nat. Hist. 2nd ser. i. p. 581 (1837, descr. orig.)[6].

Zorrillo of Mexicans (common to all the species)[4].

Hab. Mexico (*Mus. Brit.*[6]), near City of Mexico (*Deppe*, *Mus. Berol.*[1]), Guanajuato (*Dugès*[4]), Orizaba (*Botteri*, *U.S. Nat. Mus.*[5]).

After an examination of the specimens in the Berlin and British Museums, I fully agree with Dr. Coues in regarding the Long-tailed Skunk as deserving of specific recognition. In none of the numerous varieties of *M. mephitica* have I been able to find an approach to the broad hoary dorsal band with narrow lateral white stripes which mark this species; and the great proportional length of the tail also appears to be constant. As Dr. Coues has shown, this is not the *M. macrura* of Audubon and Bachman*, which is identical with *M. mephitica*; and I have already given my reasons for referring Lichtenstein's *M. vittata* to that species, instead of to the present, as suggested by Dr. Coues[5]. Nor, as will be seen presently, do I agree with that gentleman in giving Mr. Tomes's *M. longicaudata* as even a doubtful synonym of *M. macrura*; so that there appears to be no recorded evidence of the occurrence of the latter outside of the boundaries of Mexico. Judging from the few specimens of which the exact localities have been recorded, the Long-tailed Skunk seems to inhabit the central and southern States of that Republic, occurring in some places along with the last species.

3. **Mephitis putorius.**

Viverra putorius, Linnæus, Syst. Nat. i. p. 64 (1766, ex Catesby)[1].

Spilogale putorius, Coues, Bull. U.S. Geol. Surv. 2nd ser. no. 1, p. 12[2].

Mephitis (*Spilogale*) *putorius*, Coues, Fur-bearing Anim. p. 239[3].

? *Mephitis interrupta*, Rafinesque, Ann. of Nature, no. 3, p. 4 (1818, descr. orig)[4]; Dugès, La Nat. i. p. 137[5].

* Quad. N. Am. iii. p. 11, pl. cii.

Mephitis bicolor, Gray, Mag. Nat. Hist. 2nd ser. i. p. 581 (1837, descr. orig.)[6]; Baird, Mamm. N. Am. p. 197[7]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 21[8].
Mephitis zorilla, Lichenstein, Abh. Ak. Berl. 1836, pl. ii. fig. 2 (1838, descr. orig.); [nec Licht. Darst. neu. Säugeth. pl. xlii. fig. 2 (1834)][9].
Itzquiepatl seu *Vulpecula*, Hernandez, De Quad. Nov. Hisp. fol. 6, cap. xviii.

Hab. North America, from Iowa southwards [3].—Mexico, Guanajuato (*Dugès* [5]), Yucatan (*Gaumer*, *Mus. Boucard*); Guatemala (*Godman & Salvin*, *Mus. Brit.*).

Linnæus's diagnosis and his citation of Catesby leave no doubt that the *Viverra putorius* of his twelfth edition was primarily founded on this animal, though he evidently confounded other species in his description and references. This appears to me to be one of the cases in which zoologists are free either to retain or reject a Linnæan name; and I have followed Dr. Coues in the former course, because a great deal of uncertainty and confusion of nomenclature is thereby avoided.

A few years ago the Little Striped Skunk was only known as a native of Texas and California; but its range is now found to be much more extensive, reaching as far north as Iowa, if not to New York[3]. It is common in Florida; and Mr. Maynard informed Mr. Allen that "they are domesticated and used there as cats, the odour-glands being removed when the animals are young; they become very tame, and are quite efficient in destroying the mice (*Hesperomys*, sp.) that infest the houses" *. In Mexico Dr. Dugès met with this species in the State of Guanajuato[5]; M. Boucard has received it from Yucatan; and its range extends into Guatemala, where Messrs. Godman and Salvin obtained several specimens. Further south I have not been able to trace its existence.

4. CONEPATUS.

Conepatus et *Marputius*, Gray, Mag. Nat. Hist. ser. 2, i. p. 581 (1837).
Thiosmus, Lichtenstein, Abh. Ak. Berl. 1836, p. 270 (1838).

The Neotropical type of Skunk differs from the Nearctic in having only two premolars above (in normal specimens), in its depressed and obliquely truncated snout in which the nostrils open forwards and downwards, in its broad feet with wholly naked soles, and its shorter and more closely-haired tail.

Colour is at least as variable in this as in the last genus; but unfortunately we have not equal material to assist in discriminating between specific characters and individual variation. There seems, however, to be little doubt that most of the described species (about sixteen in number) will have to be abolished, and still less that one only has yet been found north of the Isthmus of Panama. In it the broad white dorsal band may or may not be partially divided by a median black stripe; in the former case the

* Bull. Mus. Comp. Zool. ii. p. 169.

animal bears a superficial resemblance to *Mephitis mephitica*, but will at once be recognized by the generic characters pointed out above.

1. Conepatus mapurito.

Viverra mapurito, Gmelin, Linn. Syst. Nat. i. p. 88 (1788, ex Mutis)[1].
Mephitis mapurito, Lichtenstein, Abh. Ak. Berl. 1836, p. 270[2].
Conepatus mapurito, Coues, Bull. U.S. Geol. Surv. ser. 2, no. 1, p. 14[3]; Fur-bearing Anim. p. 249[4].
Mephitis leuconota, Lichtenstein, Darst. neu. Säugeth. pl. xliv. fig. 1 (1834, descr. orig.)[5].
Mephitis mesoleuca, Lichtenstein, op. cit. pl. xliv. fig. 2 (1834, descr. orig.)[6]; Baird, Mamm. N. Am. p. 192[7]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 19[8]; Tomes, P. Z. S. 1861, p. 280[9].
Mephitis nasuta, Bennett, P. Z. S. 1833, p. 39 (descr. orig.)[10].
Thiosmus nasutus, Dugès, La Nat. i. p. 137[11].
Conepatus nasutus, Gray, Cat. Carn. &c. Mamm. Brit. Mus. p. 134[12].
Mephitis intermedia, de Saussure, Rev. et Mag. Zool. 1860, xii. p. 6 (descr. orig.)[13].
? *Mephitis longicaudata*, Tomes, P. Z. S. 1861, p. 280 (descr. orig.)[14].
Mephitis chilensis, Frantzius, Arch. f. Naturg. xxxv. 1, p. 289 (nec Geoffroy?)[15].
Zorro hediando of Costa-Ricans.

Hab. North America, Texas[4].—Mexico, Rio Alvarado, Chico (*Deppe*, *Mus. Berol.*[5 6]), Mexico (*de Saussure*[13]), Guanajuato (*Dugès*[11]); Guatemala (*Godman & Salvin*); Costa Rica (*Frantzius*[15]).—South America to Patagonia?

The gradations of colour shown by the South-American Skunks are so numerous, and apparently so little connected with geographical distribution, that I must follow the late Dr. Gray[12] and Dr. Elliott Coues[4] in regarding them, provisionally at least, as varieties of one very variable species. The most usual type in Central America appears to be the white-backed, to various modifications of which the names *leuconota*, *mesoleuca*, *nasuta*, and *intermedia* have been applied; but the form in which the white is more or less divided into lateral stripes also occurs. I have been unable to identify in the British Museum the Guatemalan specimen to which Mr. Tomes gave the provisional name of *Mephitis longicaudata*[14]; but from his description I believe it to have been an example of the present species, in which the tail was either unusually long or had been unduly stretched in preservation. A drawing by Mrs. Salvin of one of the Skunks in the Museum of Guatemala certainly represents *Conepatus mapurito*.

Dr. v. Frantzius met with the two-striped variety in Costa Rica, and identified it with the *Mephitis chilensis* of Geoffroy. He gives the following account of its habits, which appear to be much the same as those of the North-American species:—"Like its congeners the Chilian Skunk is a nocturnal animal, remaining hidden about human habitations by day, and going forth at night to plunder. As it is peculiarly destructive to poultry, the Costa-Ricans call this animal *Zorro* (Fox), or, to distinguish it from the Opossum, *Zorro hediando*, or Stinking-Fox. Often it is surprised in its robberies by dogs; and Skunks thus killed are not uncommonly seen lying in the streets of the

towns. When this animal voids the contents of the odour-glands the stench is so great that it is perceptible at a distance of many hundred paces; but fortunately it only does so when pursued and in danger."

5. TAXIDEA.

Taxidea, Waterhouse, P. Z. S. 1838, p. 154.

The American Badger was first generically separated from its Old-World representatives by Mr. Waterhouse, who pointed out various important dental and cranial differences. Among these may be particularly mentioned the great breadth and abrupt truncation of the occipital region of the skull, the large size of the auditory bullæ, and the possession of only *thirty-four* teeth * instead of thirty-six (or rather thirty-eight †), as in *Meles*. Externally the body is stout and depressed, the tail very short, and the claws of the fore feet powerfully developed.

As will be seen below, only one species of *Taxidea* is now recognized by American zoologists.

1. Taxidea americana.

Ursus taxus, var. *β. americanus*, Boddaert, Elench. Anim. i. p. 136 (1787, descr. orig.)[1].
Meles americanus, Zimmermann, Pennant's Arktische Zool. i. p. 74[2].
Taxidea berlandieri, Baird, Mamm. N. Am. p. 205 (1857, descr. orig.)[3]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 21[4].
Taxidea americana berlandieri, Allen, Bull. U.S. Geol. Surv. ii. p. 331[5]; Coues, Fur-bearing Anim. p. 289[6].
? *Tlacoyotl* seu *Coyotl humile*, Hernandez, De Quad. Nov. Hisp. fol. 12, cap. xxxvii.
Texon, Tejon, of Mexicans.

Hab. North America, from 58° N. lat. southwards [6].—Mexico (*Brandt, Mus. Brit.*), Interior and Eastern States, Nuevo Leon, Tamaulipas (*Berlandier* [6]), Matamoras (*U.S. Nat. Mus.*[5]).

The southern race of the American Badger is distinguished by the white facial stripe

* Dr. Coues has pointed out that Mr. Waterhouse, in his extended paper (Trans. Z. S. ii. pp. 343–348, pl. lix.), gave the dental formula of *Taxidea* incorrectly, making the lower "false molars" 2 . 2 instead of 3 . 3, and counting the upper sectorial tooth as a molar instead of a premolar ('Fur-bearing Animals,' p. 262, footnote). From the context of Mr. Waterhouse's paper it is evident that the former error was an accidental slip. The correct formula is—i. $\frac{6}{6}$, c. $\frac{1.1}{1.1}$, pm. $\frac{3.3}{3.3}$, m. $\frac{1.1}{2.2}=\frac{16}{18}=34$.

† Some confusion has existed as to the dentition of the European Badger, owing to the existence of a small deciduous tooth behind each upper canine. This tooth, which is easily lost, and, according to Professors Moseley and Ray Lankester, has no predecessor in the milk-dentition (Journ. Anat. Phys. iii. p. 79), is not noticed by Fréderic Cuvier, De Blainville, or Owen, but was present in the skull described and figured by Blasius (Säugeth. Deutschl. p. 203), who gives the whole number of teeth as thirty-eight.

being generally continued along the spine towards the tail, and by its more reddish-grey tinge of colour. This dorsal line, however, is more or less interrupted in different specimens; and the minor cranial characters, on which Professor Baird relied in his specific separation of *T. berlandieri* [3], are stated by Dr. Coues to be negatived by the examination of a larger series of skulls [6]. There seems therefore to be little doubt that that gentleman and Mr. Allen are correct in treating the Mexican Badger as a local race of *T. americana*.

The American Badger appears to be common in the Northern and North-eastern States of Mexico, especially, according to Dr. Berlandier, in Nuevo Leon and Tamaulipas; but I have not been able to trace its range further to the south. Dr. Coues states that Berlandier's manuscripts contain "several biographical notices—nothing, however, to indicate any differences of moment in its habits as compared with those of *T. americana*" [6].

6. LUTRA.

Lutra, Erxleben, Syst. Reg. An. p. 445 (1777).

Of this well-known and very widely distributed genus several Neotropical species have been described. Of these the only one positively known to inhabit our sub-region may be easily known by its small size, its proportionally long tail, and by the form of its naked muffle, which is broad transversely and distinctly biconcave above, its upper margin forming a double curve with a sharp middle angle, thus ⌣⌣. Other Otters have been recorded as natives of Central America, but, as will be seen presently, on very doubtful evidence.

1. **Lutra felina.**

Mustela felina, Molina, Sagg. Stor. Nat. Chili, p. 284 (1782, descr. orig.)[1].
Nutria felina, Gray, P. Z. S. 1865, p. 128[2]; Cat. Carn. &c. Mamm. p. 106[3].
Lutra felina, Coues, Fur-bearing Anim., p. 301[4].
Lutra chilensis, Bennett, P. Z. S. 1832, p. 1 (descr. orig.)[5]; Tomes, op. cit. 1861, p. 279[6].
Lutra californica, Gray, Mag. Nat. Hist. ser. 2, i. p. 580 (descr. orig.)[7].
? *Lutra brasiliensis*, Frantzius, Arch. f. Naturg. xxxv. 1, p. 288 (nec F. Cuvier)[8].
? *Lutra canadensis*, Frantzius, tom. cit. p. 289 (nec Turton)[9].
Perro de agua of Guatemalans.
Nutria of Costa-Ricans [8 9].

Hab. North America, Pacific slopes, from Alaska? [4].—Mexico, Orizaba (*U.S. Nat. Mus.*[4]), Tehuantepec (*Sumichrast*, ib.[4]); Guatemala, (*U.S. Nat. Mus.*[4]) Santana Mixtan, Coban (*Godman & Salvin*, *Mus. Brit.*[6]); Costa Rica (*Frantzius* [8 9]); Panama (*Boucard*, *Mus. Berol.*).—South America to Chili[1].

All the Central-American Otters which I have seen, and all those examined by

Mr. J. A. Allen and by Dr. Coues, belong to this well-marked species; and there can be little doubt that Dr. v. Frantzius was in error in his determination of *Lutra brasiliensis* and *L. canadensis* in Costa Rica. Of the former he says that the headless and footless skins brought to the markets appeared to belong to that species, and that a specimen sent to the Dresden Museum by Herr Schröter had been determined by Professor Reichenbach [8]. The skins may be dismissed as quite inadequate evidence; and there would seem to be some mistake about the Dresden example, for I could find no specimen of *L. brasiliensis* when I visited that collection; and the present Director, Dr. A. B. Meyer, informs me that the only specimens which the Museum received from Herr Schröter were Reptiles. As to *L. canadensis*, Dr. v. Frantzius says that a Costa-Rican Otter in the collection of Dr. Joos, of Schaffhausen, agreed with the North-American species in its skull and in its naked muffle, which "ran up in a pointed angle" [9]. This last character is diagnostic of *L. felina*, and not of *L. canadensis*, in which the muffle is an irregular pentagon, which has been aptly compared to the shape of the ace of clubs.

Molina's Otter has a wide range on the western slope of both the Americas, from Chili, where it was first described, northwards. It is still somewhat uncertain to what latitude its northern range attains: specimens obtained from the MM. Verreaux by the British Museum are labelled "Kamptschatka" [2]; and this is partially confirmed by Dr. Coues, who doubtfully refers skulls from Alaska to this species [4].

Messrs. Godman and Salvin give me the following account of their observations on this animal in Guatemala:—"Otters are pretty generally distributed in suitable places throughout the country. The first occasion on which we met with them was near Santana Mixtan, a village in the Pacific-coast region, where the specimen called *Lutra chilensis* by Mr. Tomes [6] was shot in a stagnant lagoon in the forest. We afterwards found Otters not uncommon in the river of Coban, close to the town, a favourite resort being some pools near the stream. We also met with them in the river of Copan, near the celebrated Indian ruins. Having crept through the curious tunnel of masonry which pierces the hill known as the 'cerro de la ventana,' we came to a high wall overhanging the river, in which several Otters were playing in a pool below us."

Fam. V. URSIDÆ.

1. URSUS.

Ursus, Linnæus, Syst. Nat. i. p. 69 (1766).

Two species of Bear are included in the fauna of our subregion, but appear to have been hitherto only found towards its northern extremity. These are the well-known Black or Cinnamon Bear of North America, and the dreaded "Grizzly" of the Rocky Mountains. Concerning the specific identity of both these animals, especially the latter, there has been not a little diversity of opinion.

The latest writer on the subject in America is Mr. J. A. Allen, who at one time went so far as to unite all the terrestrial Nearctic Bears with the Old-World *Ursus arctos*, Linn.* More recently, however, he has changed his views, and, while he still identifies the Barren-Ground Bear of Richardson with *U. arctos*, he regards the Black or Cinnamon Bear as unquestionably distinct, and accords "subspecific" rank to the Grizzly †, the differences between the latter and *U. arctos* being considered to be appreciable, but to be neither constant nor important. Other authorities, on the other hand, regard the cranial and dental characters of the Grizzly Bear as full of specific value; and Professor Busk, who identifies it with the extinct *U. fossilis*, Goldfuss, has lately contrasted its dentition with that of *U. arctos* in great detail‡. Not having the materials on which to ground an independent personal opinion, I have thought it best to retain the Grizzly Bear provisionally as a distinct species, although I do not think it unlikely that Mr. Allen's view may be supported by further observation, and that *U. horribilis* and *U. arctos* may prove to grade into one another. Following this course, the North-Mexican Bears may be thus characterized:—

1. *U. horribilis.* Fur of body with yellowish or hoary tips, and usually a dark dorsal band; fore claws double the length of those of the hind feet. Frontal region of skull flattened; outer margin of last upper molar nearly straight.
2. *U. americanus.* Fur uniform in colour, either black or reddish-brown; fore claws moderate. Frontal region of skull convex; outer margin of last upper molar convex in the middle.

Whether the genus *Ursus* does not reappear at the other extremity of the Central-American subregion is, perhaps, open to doubt; for Dr. v. Frantzius was assured by the Costa-Rican woodcutters and hunters that a large animal, which they termed *Oso real*, was sometimes, though very rarely, found in the higher-lying forests, and that it reared itself up when attacked. He observes that though the Great Anteater is known by the same name, it cannot be the animal meant, as it is well known, and, besides, does not inhabit the same regions; and he therefore believed that the range of the South-American Spectacled Bear (*U. ornatus*, F. Cuv.) might prove to extend to Costa Rica §. No further evidence, however, has been recorded in confirmation of this view.

1. Ursus horribilis.

Ursus horribilis, Ord, Guthrie's Geogr. (2nd Amer. ed.) p. 291 (1815, descr. orig., fide Baird)[1]; Baird, Mamm. N. Am. p. 219[2].

Ursus horribilis, var. *horriaeus*, Baird, Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 24[3].

Ursus arctos, subsp. *horribilis*, Allen, Bull. U.S. Geol. Surv. ii. p. 336[4].

* Bull. Mus. Comp. Zool. i. pp. 184–192.

† Bull. U.S. Geol. Surv. ii. pp. 334–342.

‡ Trans. Z. S. x. pp. 60–69.

§ Arch. f. Naturg. xxxv. 1, p. 294.

Hab. North America, west of the River Missouri, from the Dominion of Canada southwards [2].—Mexico, Los Nogales (*Kennerly, U.S. Nat. Mus.*[3]).

The existence of the Grizzly Bear in the Northern States of Mexico is attested by the naturalists of the United-States Boundary Survey [3 4]. The single specimen obtained by them in Sonora presented some slight variations in coloration and proportions from Californian examples, which induced Professor Baird to describe it as a separate variety (*horriaeus*); but they were merely comparative, and may not improbably have been individual peculiarities.

How much further the Grizzly Bear may extend into Mexico I have been quite unable to learn. Mr. J. W. Hinchliff was assured at Mazatlan that Bears were very numerous in the mountains of the interior *; but he appears to have obtained no evidence in confirmation of the report.

2. Ursus americanus.

Ursus americanus, Pallas, Spicil. Zool. fasc. xiv. p. 6 (1780, descr. orig.)[1]; Dugès, La Nat. i. p. 137 [2]; Allen, Bull. U.S. Geol. Surv. ii. p. 338 [3].

Ursus americanus, var. *cinnamoneus*, Baird, Mamm. N. Am. p. 228 [4].

Ursus cinnamoneus?, Baird, Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 29 (1859, ex Audubon & Bachman)[5].

Hab. North America, from Alaska southwards [3].—Mexico, Sonora (*Dugès* [2]).

The Black and Cinnamon Bears of North America were separated as varieties by Audubon and Bachman †; and Professor Baird, in treating of a specimen of the latter killed close to our northern boundary, raised it, though with some doubt, to specific rank [5]. It appears now to be certain, however, that the two forms cannot even be regarded as distinct races; Mr. Allen observes that their skulls are not in any way distinguishable, and that the distinction between the animals "is one of colour only, and inconstant as characterizing any particular locality or region" [3].

According to Dr. Dugès the American Bear is found in the Mexican State of Sonora [2]; but I have not been able to trace it further to the southward.

[PHOCIDÆ—OTARIIDÆ.]

The existence of Seals on the coasts and islands of Central America was recorded by some of the older voyagers. Dampier, in describing "the *Alcranes*, 5 or 6 low sandy Islands, lying in the Lat. of about 23 d. North, and distant from the Coast of *Jucatan* about 25 Leagues," observes, "Here are many Seals: they come up to sun themselves only on two or three of the Islands, I don't know whether exactly of the same kind with those in colder Climates, but, as I have noted in my former Book, they always

* 'Over the Sea' (London, 1876), p. 118.

† Quad. N. Amer. iii. p. 125.

live where there is Plenty of Fish"*; and he further informs us that these islands were visited by English ships from Jamaica for the purpose of obtaining "Seal-Oyl"†. I have been unable to find any modern record of the capture of Seals on the east coast of Central America, or to trace any specimens in the European Museums. The most likely species to occur would be the West-Indian forms named *Phoca tropicalis*‡ and *Cystophora antillarum*§ by Gray—animals of which nothing is known beyond the imperfect type specimens in the British Museum, and the field-notes of Mr. Hill, quoted by Mr. Gosse‖.

Nor can I find evidence of the occurrence on the Pacific coast of Central America of any of the Seals or Sea-Lions of that ocean, although the southern *Otaria jubata* (Foster) extends its range up the western seaboard of South America to Peru, while the northern *O. stelleri* (Lesson), *O. gilliespii* (M^{c}Bain), and *Arctocephalus ursinus* (Linn.) are all found on the coasts of California, as is also the Elephant-Seal, *Macrorhinus leoninus* (Linn.)¶. This distribution may possibly be caused, as suggested to me by Mr. H. Saunders, by the fact that Humboldt's Current and the North-Pacific Drift-Current lower the ocean temperature along the coasts of South and North America, but sweep out to the westward when they reach Peru and California respectively, leaving a greatly warmer interval between these shores; and another reason may be the general absence of islands along this coast.

Order V. SIRENIA.

Few Mammals have excited more general interest than the little group which consists of the Manatee, the Dugong, the now extinct Rhytina, and their fossil allies. The peculiar habits and appearance of the recent species (lately rendered familiar in Europe and America by the exhibition of living specimens in confinement) have always attracted the interest of the general public; while the combination of divergent and abnormal characters in their organization rendered them long a standing puzzle to the systematic zoologist. Thus Linnæus associated them with the Walrus, Cuvier with the Whales, and de Blainville with the Elephants; and it was only when their anatomy had been more fully worked out** that naturalists generally recognized their claims to be regarded

* Dampier's Voyages, ii. pt. 2, p. 25. † *Tom. cit.* p. 27.

‡ Cat. Mamm. Brit. Mus. pt. 2 (Seals), p. 28 (1850, descr. orig.); *Monachus tropicalis*, Cat. Seals and Whales Brit. Mus. p. 20.

§ P. Z. S. 1849, p. 93 (descr. orig.); Ann. & Mag. Nat. Hist. (2nd ser.) vi. p. 60; Cat. Seals and Whales, p. 43.

‖ 'Naturalist's Sojourn in Jamaica,' pp. 307–314.

¶ *Cf.* Peters, Monatsb. Ak. Berl. 1877, pp. 505–507; Scammon, Marine Mamm. N. Amer. pp. 113–137.

** Of the principal exponents of the structure of the Sirenia, the names of Bischoff, Knox, Owen, Brandt, Vrolik, Krauss, Murie, Garrod, Chapman, and Harting may be mentioned: references to the memoirs specially treating of *Manatus* will be found below.

as a perfectly distinct order of Mammalia, only distantly connected with any other form, but having most affinities with the Ungulates and Proboscideans. As to their distribution, the two existing genera are confined to the shores of the tropical and sub-tropical seas—*Manatus* to the Atlantic, and *Halicore* to the Indian Ocean and parts of the Pacific—while *Rhytina* was till lately a native of the icy waters of Behring Straits.

Fam. I. MANATIDÆ.

1. MANATUS.

Manatus, Storr, Prod. Meth. Mamm. p. 41 (1780, part. ex Rodelentia) ; Illiger, Prod. Syst. Mamm. p. 140 (1811)*.

The genus *Manatus* may be at once distinguished from its nearest ally, *Halicore*, by its rounded tail-fin, and by the presence of rudimentary nails on its flippers, as well as by many important features of its internal organization. Thus, the whole shape of the skull is very different, there are no incisors in the permanent dentition, and only six cervical vertebræ are present, forming one of the few known exceptions to the usual number in the Mammalian class. The anatomy of the American Manatee has been studied by various eminent zoologists †, and may now be considered to be as well known as that of most tropical Mammals.

Several species of Manatee have been described from time to time; but further investigation has disposed of the claims of all save two—the *Manatus australis* (or *americanus*) of the western, and the *M. senegalensis* of the eastern coasts of the tropical Atlantic. Nor is the specific distinctness of these two forms at all clearly demonstrated; for most of the osteological differences pointed out by Cuvier and his followers were found to disappear when sufficient series of specimens were compared by Professors Schlegel ‡ and Brandt § and Drs. Krauss ‖ and Gray ¶. The last-named writer fell back on a single character, which he himself acknowledged not to be absolutely constant, namely the state of the rudimentary nasals, which are usually sufficiently developed in *M. australis* to make a pit or hollow in the anterior edge of the frontals, whereas in *M. senegalensis* they are either absent or so small as not to leave any impression on the other bones. But the fine Cuban skeleton in the Museum of the

* *Manatus* of Storr appears to have included the "Manati" of Steller (*Rhytina*), and, by implication, the present genus, the Dugong being separated as *Trichechus*. Illiger was the first writer who characterized the genera of Sirenia in a scientific manner; and his names have been so generally adopted that much inconvenience would be caused by any change. The transference of the Linnæan name *Trichechus* from the Walrus to the Manatee has been recently proposed, but on what appear to me to be totally inadequate grounds.

† Among these may be especially mentioned:—Brandt, Mém. Ac. Pétersb. 6me sér. v. pp. 134–137, & 7me sér. xii. pp. 242–253; Vrolik, Bijdr. tot de Dierkunde, i. art. 5; Krauss, Arch. f. Anat. 1862, pp. 415–427; Murie, Trans. Zool. Soc. viii. pp. 127–202, & xi. (in the press); and Garrod, *op. cit.* x. pp. 137–145.

‡ Abhandl. Zool. u. vergl. Anat. i. pp. 9–13.

§ Mém. Ac. Pétersb. 7me sér. xii. p. 241.

‖ Arch. f. Anat. 1858, pp. 390–425.

¶ Ann. & Mag. Nat. Hist. 3rd ser. xv. pp. 130–139.

Royal College of Surgeons agrees with African specimens in this respect; and the same appears to be the case with two of the American skulls figured by de Blainville*. A more constant character appears to be found in the condition of the anterior edge of the frontals, where they form the upper margin of the large nasal fossa; in the American Manatee this edge is straight, thin, and often denticulate, while in the African it is commonly thickened and rounded: but here, again, we find exceptions, for an African skull in the British Museum has frontals of the usual American type. On the whole it may be said that the skulls of American and African Manatees may usually, but not invariably, be separated, and that more information as to the rest of the organization of the latter form is required before its specific distinction can be regarded as proved. As to the supposed existence of two distinct species in America, it is enough to say that the minor cranial characters on which Harlan founded his *M. latirostris* proved to be quite inconstant and untrustworthy.

1. **Manatus australis.** (Tab. VII.)

Trichechus manatus, Linnæus, Syst. Nat. i. p. 49 (1766, part.) [1].
Trichechus manatus α. australis, Gmelin, Linn. Syst. Nat. i. p. 60 (1780) [2].
Manatus australis, Tilesius, Tiles. Jahrb. f. Naturg. i. p. 23 (1802, ex Gmelin) [3]; Ozeretskovski, Nov. Act. Petrop. xiii. p. 375 [4].
Manatus americanus, Desmarest, Nouv. Dict. d'Hist. Nat. xvii. p. 262 (1817, ex Cuvier) [5]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 304 [6].
Manatus latirostris, Harlan, J. Acad. Philad. iii. p. 394 (1823, descr. orig.) [7].
Vacca de Agua of Guatemalans.

Hab. North America, coasts of the Gulf of Mexico.—Mexico, Yucatan (*Dampier*); British Honduras (*Salvin & Godman*); Guatemala, Lake of Yzabal (*Salvin & Godman*); Honduras (*Mus. Coll. Surg.*); Nicaragua, Blewfields River (*Dampier*); Costa Rica, river Sarapiqui, San Juan [6].—South America, north and east coasts, southward to Brazil.

The Manatee, or Sea-Cow, was naturally one of the first American Mammals to obtrude itself on the attention of the old voyagers. Professor Brandt, in the memoir already referred to, has drawn attention to the accounts of many of the earlier writers, both Spanish and English, who recorded its abundance and value as food. Of these, tne description of Captain Dampier is so vivid and exhaustive, that I quote it entire:—

"While we lay here [off the coast of Nicaragua], our *Moskito* Men went in their Canoa, and struck us some Manatee, or Sea-Cow. Besides this *Blewfield's* River, I have seen of the Manatee in the Bay of *Campeachy*, on the Coasts of *Bocca del Drago*, and *Bocco del Toro*, in the River of *Darien*, and among the South Keys or little Islands of *Cuba*. I have heard of their being found on the North of *Jamaica* a few, and in the Rivers of *Surinam* in great Multitudes, which is a very low Land. I have seen

* Ostéographie, Atlas, genus *Manatus*, pl. iii., under the names of *M. latirostris*? and *M. australis*.

of them also at *Mindanea* one of the *Philippine* Islands; and on the Coast of *New Holland**. This Creature is about the Bigness of a Horse, and 10 or 12 Foot long. The Mouth of it is much like the Mouth of a Cow, having great thick Lips. The Eyes are no bigger than a small Pea, the Ears are only two small holes on each side of the Head. The Neck is short and thick, bigger than the Head. The biggest Part of this Creature is at the Shoulders, where it hath two large Fins, one on each side of its Belly. Under each of these Fins the Female hath a small Dug to suckle her young. From the Shoulders towards the Tail it retains its bigness for about a Foot, then groweth smaller and smaller to the very Tail, which is flat, and about 14 Inches broad, and 20 Inches long, and in the Middle 4 or 5 Inches thick, but about the Edges of it not above 2 Inches thick. From the Head to the Tail it is round and smooth without any Fin but those two before mentioned. I have heard that some have weighed above 1200 *l.* but I never saw any so large. The Manatee delights to live in brackish Water; and they are commonly in Creeks and Rivers near the Sea. 'Tis for this reason possibly they are not seen in the *South Seas* (that ever I could observe) where the Coast is generally a bold Shore, that is, high Land and deep Water close home by it, with a high Sea or great Surges, except in the Bay of *Panama*; yet even there is no Manatee. Whereas the *West-Indies*, being as it were, one great Bay composed of many smaller, are mostly low Land and shoal Water, and afford proper Pasture (as I may say) for the Manatee. Sometimes we find them in salt Water, sometimes in fresh; but never far at Sea. And those that live in the Sea at such Places where there is no River nor Creek fit for them to enter, yet do commonly come once or twice in 24 Hours to the Mouth of any fresh Water River that is near their Place of Abode. They live on Grass 7 or 8 Inches long, and of a narrow Blade, which grows in the Sea in many places, especially among Islands near the Main. This Grass groweth likewise in Creeks, or in great Rivers near the Sides of them, in such places where there is but little Tide or Current. They never come ashore, nor into shallower Water than where they can swim. Their Flesh is white, both the Fat and the Lean, and extraordinary sweet, wholesome Meat. The Tail of a young Cow is most esteem'd; but if old both Head and Tail are very tough. A Calf that sucks is the most delicate Meat; Privateers commonly roast them; as they do also great pieces cut out of the Bellies of the old ones.

"The Skin of the Manatee is of great use to Privateers, for they cut them into Straps, which they make fast on the Sides of their Canoas thro' which they put their Oars in rowing, instead of Tholes or Pegs. The Skin of the Bull, or of the Back of the Cow is too thick for this use; but of it they make Horse-whips, cutting them 2 or 3 Foot long: at the Handle they leave the full Substance of the Skin, and from thence cut it away tapering, but very even and square all the four Sides. While the Thongs are green they twist them, and hang them to dry: which in a Weeks time become as hard as Wood. The *Moskito* Men have always a small Canoa for their use to strike Fish, Tortoise [*i. e.* Turtle], or Manatee, which they keep usually to themselves, and very neat and clean.

* [These last references apply of course to the Dugong, *Halicore dugong* (Gmel.).]

They use no Oars but Paddles, the broad Part of which doth not go tapering towards the Staff, Pole, or Shandle of it, as in the Oar; nor do they use it in the same manner, by laying it on the Side of the Vessel; but hold it perpendicular, griping the Staff hard with both Hands, and putting back the Water by main Strength, and very quick Strokes. One of the *Moskitoes* (for there go but two in a Canoa) sits in the Stern, the other kneels down in the Head, and both paddle till they come to the place where they expect their Game. Then they lye still or paddle very softly, looking well about them, and he that is in the Head of the Canoa lays down his Paddle, and stands up with his striking Staff in his Hand. This Staff is about 8 Foot long, almost as big as a Man's Arm at the great End, at which there is a Hole to place his Harpoon in. At the other End of his Staff there is a piece of light Wood called Bobwood, with a Hole in it, through which the small End of the Staff comes; and on this piece of Bobwood there is a Line of 10 or 12 Fathom wound neatly about, and the End of the Line made fast to it. The other End of the Line is made fast to the Harpoon, which is at the great End of the Staff, and the *Moskito* Men keeps about a Fathom of it loose in his Hand. When he strikes, the Harpoon presently comes out of the Staff, and as the Manatee swims away, the Line runs off from the Bob; and altho' at first both Staff and Bob may be carried under Water, yet as the Line runs off it will rise again. Then the *Moskito* Men paddle with all their might to get hold of the Bob again, and spend usually a quarter of an Hour before they get it. When the Manatee begins to be tired, it lieth still, and then the *Moskito* Men paddle to the Bob and take it up, and begin to hale in the Line. When the Manatee feels them he swims away again, with the Canoa after him; then he that steers must be nimble to turn the Head of the Canoa that way that his Consort points, who being in the Head of the Canoa, and holding the Line, both sees and feels which way the Manatee is swimming. Thus the Canoa is towed with a violent Motion, till the Manatee's Strength decays. Then they gather in the Line, which they are often forced to let all go to the very End. At length when the Creature's Strength is spent, they hale it up to the Canoa's side, and knock it on the Head, and tow it to the nearest Shore, where they make it fast, and seek for another; which having taken, they get on shore with it to put it into their Canoa: For 'tis so heavy that they cannot lift it in, but they hale it up in shole Water, as near the Shore as they can, and then overset the Canoa, laying one side close to the Manatee. Then they roll [it] in, which brings the Canoa upright again; and when they have heav'd out the Water, they fasten a Line to the other Manatee that lieth afloat, and tow it after them. I have known two *Moskito* Men for a Week every Day bring aboard 2 Manatee in this Manner; the least of which hath not weighed less than 600 Pound, and that in a very small Canoa, that three *Englishmen* would scarce adventure to go in. When they strike a Cow that hath a young one, they seldom miss the Calf, for she commonly takes her young under one of her Fins. But if the Calf is so big that she cannot carry it, or [she] so frightened that she only minds to save her own Life, yet the young never leaves her till the *Moskito* Men have an opportunity to strike her.

"The manner of striking Manatee and Tortoise is much the same; only when they seek for Manatee they paddle so gently, that they make no noise, and never touch the side of the Canoa with their Paddle; because it is a Creature that hears very well. But they are not so nice when they seek for Tortoise, whose Eyes are better than his Ears"*.

Again, in his 'Voyages to *Campeachy*,' Dampier mentions that Manatees were very plentiful in the "River of *Tobasco*," "especially in one place on the Starboard-side about 2 Leagues from the Sea, which runs into the Land 2 or 300 paces, and then opens very wide, and is so shoal that you may see their backs above Water as they feed; a thing so rare, that I have heard our *Moskito-Men* say, they never saw it any where else; on the least noise they will all scamper out into the *River*; yet the *Moskito-men* seldom miss of striking them. There [*l.* These] are a sort of Fresh-water *Manatee*, not altogether so big as the Sea-kind, but otherwise exactly alike in shape and taste, and I think rather fatter"†.

In modern times Manatees, although considerably reduced in numbers, are still abundant in the more secluded lagoons and estuaries of eastern Tropical America. Of their reported existence on the western coast there is no satisfactory evidence whatever. They were stated by one or two of the old writers to be found on the coast of Peru‡; and Dr. v. Frantzius accidentally heard that Dr. Bernoulli had met with them on the west coast of Guatemala[6]. There can now be no doubt, however, that these reports were erroneous, and that the Manatee is not found on any of the Pacific shores. Considering the resemblance of the marine fauna of the two oceans and the evidence of their intercommunication in comparatively recent ages, there would have been nothing surprising in *Manatus* being common to both; and the reason of its absence from the west coast is probably that quoted above from Dampier§, namely the bold steep nature of the shore and the absence of broad shallow estuaries and lagoons.

In Costa Rica Dr. v. Frantzius says that Manatees are still very numerous all along the Atlantic coast, and in the San Juan river and its tributaries the Colorado, Sarapiqui, and San Carlos, but are prevented by rapids from ascending into the Rio Frio and Lake of Nicaragua. As in Dampier's days, they are pursued by the Mosquito Indians, who annually visit the coasts of Costa Rica in pursuit of Turtle. The petrous bones are believed by the natives to possess medical virtues, and, consequently fetch a high price[6].

Messrs. Salvin and Godman inform me that they never resided long enough on the sea-coast of Guatemala to become personally acquainted with the Manatee; but from descriptions of the animal given them by residents at Yzabal, they have no doubt of its occurrence in the large lake of that name, probably in tolerable abundance. This sheet of water is nearly at the sea-level, with a deep outlet into the Bay of Honduras. Its shores are covered with dense forest, into which run numerous creeks affording suitable feeding-ground for these animals. At Yzabal the native name for the Manatee

* Dampier's Voyages, i. pp. 33–37.

† Dampier's Voyages, ii. pt. 2, p. 109.

‡ *Cf.* Brandt, Mém. Ac. Pétersb. 7me sér. xii. p. 254.

§ *Suprà*, p. 93.

is "Vacca de Agua," or Water-Cow. They further remark that the Manatee is doubtless still found all along the shores of British Honduras; but as the creeks and rivers of that country have long been frequented by the mahogany-cutters, its numbers are greatly reduced. About the mouths of the New River and of the Rio Hondo, north of Belize, they have recent information that it is still far from uncommon.

As already observed, Manatees have been brought alive to Europe of late years, and in some cases have lived in excellent health in confinement. An unsuccessful attempt of the Zoological Society, in 1866, nevertheless produced the material for the first of Dr. Murie's excellent memoirs referred to above. In 1865 the Society succeeded in obtaining a living specimen, which, however, was only a month at the Gardens before it passed into the hands of the then Prosector—the lamented Professor Garrod. In June 1878 a second live Manatee was exhibited at the Westminster Aquarium, where it lived till March 1879; and after its death it also came under Dr. Murie's scalpel. Two purchased by the Brighton Aquarium are still, I believe, in good health.

Our illustration is from a careful drawing which Mr. Wolf made of the Westminster specimen for the editors of this work, and well represents the curious position which that animal habitually assumed when at rest. Dr. H. C. Chapman describes a Manatee, which lived for some time in the Zoological Gardens at Philadelphia, as "resting by the tip of his tail on the floor of the aquarium, his head downward, and with his back much arched" *; but Professor Flower tells me that he is assured that the individuals now at Brighton never place themselves in such an attitude under any circumstances. Further observations on living Manatees would be interesting; but there appears to be no doubt that some perfectly healthy and normal animals are in the constant habit of resti g in shallow water on the dorsal surface of the bent-forward tail in the manner here represented †.

Order VI. UNGULATA.

Suborder I. PERISSODACTYLA.

Of the three recent families which represent the once dominant group of Odd-toed Ungulates, one only, the Tapiridæ, is now indigenous to the New World. According to the views here adopted, the family now consists of a single genus, which presents the remarkable peculiarity of being found *only* in two such widely separated countries as South America and South-eastern Asia. In geological times, however, both true Tapirs and allied forms were abundant throughout the Palæarctic and Nearctic

* Proc. Acad. Philad. 1875, p. 461.

† Other positions of the Westminster Manatee will be found figured in Dr. Murie's second memoir in the 'Transactions of the Zoological Society,' now passing through the press.

Regions; but these have gradually disappeared, leaving their representatives at the two most distant extremities of their once extensive range. As far as the New World is concerned, the Tapirs are thus now an exclusively Neotropical type.

Fam. I. TAPIRIDÆ.

I. TAPIRUS.

Tapirus, Brisson, Règne Anim. p. 118 (1756).
Hydrochœrus, Erxleben, Syst. Reg. An. p. 191 (1777).

The few existing species of Tapirs present well-marked cranial features in addition to their external differences. Of late years it has been proposed to regard these characters as of generic value, the late Dr. Gray having separated the Malayan Tapir under Wagner's name of *Rhinochœrus**, and Dr. Theodore Gill the Central-American species as *Elasmognathus*†. The skulls of the latter certainly present very striking characters: in some respects they resemble that of *Tapirus indicus* rather than those of *T. americanus* and *T. roulini*; but in others they differ from all the other known species. Of these the most remarkable is the complete ossification of the mesethmoid, which forms a bony nasal septum, extending in the adult skull far in front of the short nasal bones, and clasped below by ascending plates developed from the maxillaries. Dr. Gill no unnaturally anticipated that these cranial characters would be found to be correlated with external peculiarities in the head and proboscis, and with consequent modification of habits; but not only has this proved not to be the case, but the two forms of *Elasmognathus* differ from each other in much more important cranial characters than they do from any of the other Tapirs. Under these circumstances it seems to me to be unwise to attempt to break up such a small and well-defined genus as *Tapirus*.

Five years after his first description of *Elasmognathus bairdi*, Dr. Gill announced the discovery of a second species of the genus, based on the examination of a series of five skulls sent to the Smithsonian Institution from Guatemala by Captain J. M. Dow. He proposed to name the form *E. dowi*, and gave the following preliminary notice of its remarkable cranial peculiarities:—

"The most obvious differences are in the development of the nasal and frontal bones; but these are confirmed by the differences in the dentition, especially in the form of the first premolar of each jaw. The nasal bones of the young, compared with those of the corresponding age of *E. bairdii*, are wider, especially in front of the 'pits,' and exhibit basilar processes recurrent forward along the frontal [maxillary?] bones, like those of *Tapirus*, but less developed, and the grooves for the nasal cartilages are deeper. As the animal advances in age, however, the frontals would appear to grow forward and force apart the nasals, which apparently do not increase, or even diminish

* P. Z. S. 1867, p. 884. † Proc. Acad. Philad. 1865, p. 183; Amer. Journ. Science, l. p. 142.

in size, and sooner or later are fused with the frontals! This strange outgrowth of the frontal bones has been verified on four adults; and consequently the natural suggestion that it was a monstrous individual feature is rendered improbable. The first premolars of the Guatemalan form, in comparison with those of *E. bairdii*, are in the upper jaw much narrower and divided into halves, the anterior of which is compressed and of almost uniform width, while the inner face of the posterior half bulges abruptly inwards; in the lower jaw they are also narrower, and the anterior cusp is separated by a vertical groove on the inner face of the tooth"*.

As far as I am aware, the full description promised by Dr. Gill has never appeared, and the above notes are so brief and indefinite that it is difficult to appreciate the value of the characters indicated. On making application to my kind correspondent, Professor Spencer F. Baird, I was last year intrusted with one of the typical skulls, and Dr. Gill was so good as to supervise the execution of drawings of the fronto-nasal region in two others of the series. I am indebted to Professor Alphonse Milne-Edwards for a careful sketch of a skull in the Paris Museum; and I found a large series of Central-American Tapir-skulls in the British Museum, the Museum of the Royal College of Surgeons, and in the collection of Mr. E. Gerrard, jun. In examining this material I had the benefit of the assistance of Professor Flower, Dr. Günther, and Mr. Sclater; and the result is the conviction that the characters of *T. dowi*, drawn from the fronto-nasal region, are constant and very remarkable, while those founded on differences of dentition cannot be depended upon. As these former peculiarities have never been properly figured or fully described, and as some of them are unique, I believe, in the Mammalian class, I will here enter more into osteological detail than has been thought advisable in the rest of the present work.

The comparison of a sufficient series of skulls in any species of Tapir shows the existence of a very remarkable extent of individual variation in minor dental and cranial characters; and I have not found any of the differences pointed out by Dr. Gill as distinguishing *T. dowi* from *T. bairdi* to be constant, except the extraordinary modification of the fronto-nasal region, which will be best understood by a comparison of the following descriptions with the figures on Pl. VIII.

In *T. bairdi*, as shown in figs. 1 and 2, the nasals are well-developed bones at all ages, having a considerable thickness at their base, and, consequently, articulating with the frontals by a comparatively large surface. They are considerably longer, in the adult, than their united breadth, and they form the greater portion (in some examples the whole) of the characteristic pits which lodge the basal sinuses of the nostrils. In some specimens the frontals show a slight projection between the bases of the nasals, but the latter may always be said to articulate with one another throughout the greater part of their length. When we turn to the known skulls of *T. dowi* we find a very different arrangement of these parts.

* Amer. Journ. Science, l. pp. 141, 142.

In the skull of a half-grown specimen of the latter species (retaining the milk-dentition), which was received by the Zoological Society from Corinto, and is preserved in the British Museum, the nasal region is as shown in fig. 3. The frontals form the greater part of the sinus-pits, and project considerably further forward in the middle. The nasals are small, thin, almost laminar bones; and each is divided by a transverse suture into an upper and a lower portion *, the former of which has a posterior process which forms part of the spiral central ridge of the sinus-pit. The mesethmoid is not yet ossified.

The typical skull of *T. dowi*, lent me by the United-States National Museum, is that of an adolescent female, with the last molar just coming up. As shown in fig. 4, the nasals are completely ankylosed with the frontals so as to be quite undistinguishable, although the interfrontal suture still remains open. The fused nasals and frontals expand abruptly in front of the sinus-pits, and are truncated in front, with a thin denticulated rounded edge, from beneath which the broad upper edge of the partially ossified mesethmoid projects forward. A drawing of the fronto-nasal region of a second typical skull of *T. dowi* shows precisely the same conditions, as does also a sketch sent me by Professor Milne-Edwards of the skull in the Paris Museum which was figured, though not very satisfactorily, as that of *T. bairdi* by the late M. Gervais†.

In the British Museum there is also the skull of a fully adult, but not aged, animal, which was sent from the western part of Nicaragua by Captain Dow to Mr. Sclater, by whom it was presented to the national collection. Although most of the sutures of this skull are much more closed than in the Washington and Paris specimens above described, yet the ankylosis of the nasals with the frontals is not complete. The former bones are extremely small and thin, and they are separated throughout their length by the median projection of the frontals. Each nasal is divided, as in the young animal, into two portions. On the left side these remain distinct, but on the right the lower moiety has become fused with the frontal. The mesethmoid is fully ossified and its upper edge is greatly developed, embracing the fronto-nasal projection and rising in front to the level of its upper surface. Unfortunately this skull has been considerably injured, probably by the blows by which the animal was dispatched; and I have therefore preferred to figure another of the type skulls at Washington, which presents a very similar condition of the parts, and of which a careful drawing has been kindly supplied to me (fig. 5). Here the two parts of the right nasal are still separate, while those of the left have united, but neither of the nasals has yet ankylosed with the frontals.

It will be seen from the foregoing descriptions that the peculiar characters of the fronto-nasal region in *T. dowi* have now been verified in *eight* specimens of all ages,

* In this skull the lower part of the left nasal has unfortunately been lost in preparation, but is restored in the figure.

† Journ. de Zool. ii. pl. 1.

without any instance of a gradation to the more normal structure of *T. bairdi* being discovered. The cranial characters of the two forms may be thus briefly expressed:—

1. *T. bairdi.* Nasals well developed, each ossified from a single centre, separate throughout life, thick at their base, and articulated with one another for the greater part of their length.
2. *T. dowi.* Nasals very small, each ossified from two centres, thin, more or less separated from one another by an anterior prolongation of the frontals, with which they become partially or entirely ankylosed before the animal reaches maturity.

Concerning the external characters of the two Central-American Tapirs further information is still required. The young of *T. bairdi*, which has been described by Mr. Verrill*, and figured, though not very satisfactorily, by Mr. Sclater†, is of a reddish-brown colour above, darker on the head and limbs, and irregularly marked with white spots and stripes, while the breast and belly are either spotted pale yellow or dirty white. The half-grown specimen obtained by Mr. Salvin for the British Museum, and figured by Gray‡, is dark reddish brown, passing along the back into blackish brown, and on the cheeks and sides of the neck into yellowish chestnut, which in its turn grades into the white of the throat and breast; the chin is dusky brown, and the edges of the lips are pure white. It appears to me, however, to be highly doubtful whether this is the adult livery, and whether the species is always so "easily distinguishable by the bay cheek and white breast" as Gray thought: a white throat and chest is not uncommon in the young of the other species of *Tapirus*, and there is no proof that it does not eventually disappear in the adult of *T. bairdi*.

In his original description of Dow's Tapir, Dr. Gill states that Captain Dow "was told by the party who gave him the skulls that the young *are not* marked on the body with longitudinal light-coloured stripes like *E. bairdii*; and he believes that this want of marking is evidently constant in the young of the species found in Guatemala"§. Positive evidence on this question is still wanting. Mr. Sclater, in figuring (under the name of *T. bairdi*) the young living female in the Zoological Society's Gardens, already alluded to, remarks:—"This animal, although not by any means full-grown, has nearly lost the spots of immaturity which distinguished our former specimen of this interesting species‖, received in August last; and as it also differs from the adult as figured by Dr. Gray¶, I have thought it advisable to have a careful figure made of it. It stands about 23 inches in height, and is 42 inches long, from the extended snout to the rump.

* Amer. Journ. Science, xliv. pp. 126, 127. † P. Z. S. 1871, p. 626, pl. l.

‡ P. Z. S. 1867, pp. 885, 886, pl. xlii. If the colourists have been accurate, the specimen has faded a good deal since the original drawing was made by Mr. Wolf.

§ Amer. Journ. Science, l. p. 142. ‖ This was true *T. bairdi* (*cf. infrà*, p. 103).

¶ This alludes to the half-grown specimen of *T. bairdi* described above.

Above it is rather thickly covered with brownish-black hairs of about three quarters of an inch in length. The face is rather paler. The ears, except for a portion of their outer rims, are distinctly margined with clear white. The throat and chest are of a sordid white"*. This individual died about six weeks after the date of Mr. Sclater's description, and is preserved in the British Museum; its skin shows no traces of spots, but the dirty white throat and chest are conspicuous; the chin is dusky, and the edges of the lips and the snout round the muzzle are pure white. The only other entire specimen of Dow's Tapir which is known to me is the one in the Paris Museum, from which Plate IX. is drawn. This animal, although not yet fully adult †, is still evidently full-grown, and its coloration is presumably the permanent livery. According to a carefully executed coloured drawing which Professor Alphonse Milne-Edwards has been so good as to send me, the white markings have wholly disappeared, and the animal is of a nearly uniform blackish brown, lighter on the head, and passing into pale brown on the cheeks, the edges of the lips, and the tips of the ears.

To sum up the scanty information we possess as to the external characters of the two forms. The young of *T. bairdi* is reddish brown, with irregular white spots and stripes; that of *T. dowi* is *said* to be unspotted. A half-grown specimen of the former is dark reddish brown, with chestnut cheeks and a pure white chest; a similar individual of the latter is blackish brown, with a dirty white chest. The adult of *T. bairdi* is still undescribed; that of *T. dowi* is blackish brown, the head being paler.

DESCRIPTION OF TAB. VIII.

Fronto-nasal region of the skulls of *Tapirus bairdi* and *T. dowi*, at various ages. *fr*, frontals; *n*, nasals; *mes*, upper edge of ossified mesethmoid.

Fig. 1. *T. bairdi*. Young female (with milk-dentition) in British Museum: suprà, p. 98.
Fig. 2. *T. bairdi*. Adult in British Museum: p. 98.
Fig. 3. *T. dowi*. Young female (with milk dentition) in British Museum: p. 99.
Fig. 4. *T. dowi*. Adolescent female in U.S. National Museum: p. 99.
Fig. 5. *T. dowi*. Adult in U.S. National Museum: p. 99.

All the figures are *two thirds* of the natural size.

1. **Tapirus bairdi.** (Tab. VIII. figg. 1, 2.)

Tapirus americanus, Moore, P. Z. S. 1859, p. 51 (nec Gmelin)[1]?

Elasmognathus bairdii, Gill, Proc. Acad. Philad. 1865, p. 183 (descr. orig.)[2]; Amer. Journ. Science, xliii. p. 370[3]; Verrill, op. cit. xliv. p. 126[4]; Flower, P. Z. S. 1867, p. 240[5]; Gray, tom. cit. p. 885, pl. xlii.[6]; Cat. Pachyd. &c. Mamm. p. 261[7]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 302[8] (?)

Tapirus bairdi, Dow, P. Z. S. 1867, p. 241[9]; Sclater, op. cit. 1871, p. 626, pl. l.[10]; op. cit. 1874, p. 89[11].

Danta of Spanish Americans.

* P. Z. S. 1872, p. 635, pl. li.

† *Cf.* Gervais (under the name of *T. bairdi*), Journ. de Zool. ii. p. 26.

Hab. Mexico, Oaxaca (*Liebmann, Mus. Hafn.* ?; *Rickards, Mus. R. Coll. Surg.*[11]); Honduras, Omoa (*Leyland*[1])?; Nicaragua (*Zool. Soc. Viv.*[10]); Costa Rica (*Frantzius*[8]), Pacuar, Atlantic coast (*Zeledon, Mus. Brit.*); Panama (*White, U.S. Nat. Mus.*[2]; *Mus. R. Coll. Surg.*[5]), Veragua (*Salvin, Mus. Brit.*[6]), River Chagrés (*Dow*[9]).

So far back as 1676 the Tapir was noticed as a native of Southern Mexico by Dampier, under the name of "the Mountain Cow (called by the *Spaniards Ante*)." He was somewhat confused by the suggestion of a learned person in Holland that the Mountain Cow was identical with the Hippopotamus*, but shrewdly expresses his opinion that it "must needs be of a different Species." After giving a sufficiently recognizable description of the animal, and noting that "altogether it is sweet wholesome Meat," Dampier gives the following account of its habits, which he says he received from his consorts, and from other Englishmen and Spaniards:—

"This Creature is always found in the Woods near some large River; and feeds on a sort of long thin Grass, or Moss, which grows plentifully on the Banks of Rivers; but never feeds in Savannahs, or Pastures of good Grass, as all other Bullocks do. When her Belly is full, she lies down to sleep by the Brink of the River; and at the least Noise slips into the Water: where sinking down to the Bottom, tho' very deep, she walks as on dry Ground. She cannot run fast, therefore never rambles far from the River; for there she always takes Sanctuary, in case of danger. There is no shooting of her but when she is asleep. They are found, besides this place [Campeachy], in the Rivers in the Bay of *Honduras*; and on all the Main from thence as high as the River of *Darien*. Several of my Consorts have kill'd them there, and knew their Track, which I myself saw in the *Isthmus of Darien*; but should not have known it, but as I was told by them. For I never did see one, nor the Track of any but once" †.

But it was not till fifteen years ago that the Central-American Tapirs were distinguished by zoologists. The present species, as already stated, was first characterized in 1865 by Dr. Gill from the examination of the skull, and was named by him in deserved honour of Professor Spencer F. Baird, to whose labours we owe so much of our knowledge of American zoology[2]. Its external form remained unknown till two years later, when a young animal was described by Mr. Verrill[4], and a half-grown individual by the late Dr. Gray[6 7]. Since then the range of the species has been shown to extend from Panama to Southern Mexico; but the discovery of a second species of Central-American Tapir renders further observation necessary before the exact distribution of the two forms can be properly understood. The authenticated localities from which Baird's Tapir has been recorded are widely spread. As far back as 1843 the late Professor Liebmann brought home from the Mexican State of Oaxaca the mutilated skin of a

* In the tenth edition of the 'Systema Naturæ' Linnæus doubtfully included the American Tapir in the genus *Hippopotamus*, under the name of *H. terrestris* (p. 74); but in the twelfth edition it is entirely omitted.

† Dampier's 'Voyages,' ii. pt. 2, pp. 102, 103.

Tapir, which is still preserved in the Copenhagen Museum, but is in too bad condition to be satisfactorily determined*. In 1874, however, two skulls were sent from that State by Mr. Constantine Rickards to Mr. Sclater, who presented them to the Museum of the Royal College of Surgeons [11]; and these prove to belong to *T. bairdi*. The young male figured by Mr. Sclater [10] was obtained by Mr. D. Ridpath from the interior of Nicaragua; and the British Museum has recently purchased, through the Smithsonian Institution, a complete skeleton of this species, one of a pair sent by Señor Zeledon's collectors from Pacuar, on the Atlantic coast of Costa Rica. The half-grown specimen which Mr. Salvin procured for the British Museum [6 7] was obtained, he informs me, from Veragua. Dr. Gill's type specimens were collected by Dr. White at Panama [2]; and Captain Dow wrote to Mr. Sclater in 1867 that in that State specimens had hitherto been exclusively found on the Atlantic side of the Isthmus and to the north of the Chagres River [9]. As it will be presently seen that Dow's Tapir has been found in Guatemala, Nicaragua, and Costa Rica, it would appear that both species are found in these States, and that the range of *T. bairdi* extends further both to the northward and to the southward than that of *T. dowi*.

Owing to the confusion of the two forms, it is impossible to say with certainty which species it was that was met with in Nicaragua by the late Mr. Belt, who observes that the Danta is a harmless beast, and that one of his men, who came suddenly upon one near Peña Blanca, killed it with his knife †. In Costa Rica Dr. v. Frantzius says that Baird's Tapir is found both in the hot lowlands and on the highest mountain-ranges. The *Danta*, he tells us, "is much hunted, for its flesh is very delicate; the backwoodsmen salt it or dry it in the air, and thus provide themselves with large stores. Its thick hide is also useful, for thongs cut from it are twisted and dried, and form very lasting riding-whips. Tapirs are very fond of the salt-licks which are formed in the neighbourhood of the numerous mineral springs by the evaporation of the saline water; here they are either shot with bullets on moonlight nights, or are hunted down with dogs and killed with spears" [8].

According to Captain Dow's observations in Panama, the favourite haunts of Baird's Tapir "appear to be in the hills lying at the back of Lion Hill and the adjoining stations of the Panama railway. It is only during the rainy season that they seem to seek the lowlands; for it is only at that season that they are captured. They are not hunted by the natives; and it is only when they happen to stray out into the open spaces of the railway that the young ones are sometimes captured alive and the old ones shot" [9].

South of the Isthmus we have no evidence of the existence of Baird's Tapir, it being seemingly replaced in Colombia by the Andean Tapir, *T. roulini*, Fischer, in the mountains, and by the common species, *T. americanus*, Gmelin, in the warm lowlands ‡.

* *Cf.* Reinhardt, P. Z. S. 1867, p. 473, footnote.

† 'Naturalist in Nicaragua,' p. 144.

‡ *Cf.* Goudot, Compt. Rend. Ac. Par. xvi. pp. 331–334.

2. **Tapirus dowi.** (Tab. VIII. figg. 3–5; Tab. IX.)

Tapirus bairdi, Sclater, P. Z. S. 1867, p. 473[1]; op. cit. 1872, p. 635, pl. li.[2]; Gervais, Journ. de Zool. ii. p. 26, pl. i. (nec Gill)[3].

Elasmognathus dowi, Gill, Amer. Journ. Science, l. p. 142 (1870, descr. orig.)[4].

Tapirus dowi, Alston, P. Z. S. 1879, p. 666[5].

Hab. Guatemala (*Dow*, *U.S. Nat. Mus.*[4]); Nicaragua, Volcan Viejo (*Dow*, *Mus. Brit.*[1 5]), Corinto, Pacific coast (*Dawes*, *Mus. Brit.*, *ex Viv. Zool. Soc.*[2 5]); Costa Rica, Atlantic coast (*Carmiol*, *Mus. Par.*[3]).

I have given full details above of the discovery of this very remarkable animal by Dr. Gill[4], and of the further information which I have been able to add as to its characters. Last year I briefly announced that the skull sent by Captain Dow to Mr. Sclater as that of *T. bairdi* was really referable to *T. dowi*, and that the same was the case with the young specimen obtained by the Zoological Society from Corinto (a small town near Realejo)[2], and now preserved in the British Museum. As Dr. Gill mentioned no precise localities, and as the latter places are both in the western part of Nicaragua, I suggested that the range of Dow's Tapir might prove to be confined to the Pacific slopes of that State and of Guatemala[5].

Since then my attention has been directed to the figures given by the late Professor Gervais of a skull of "*Tapirus bairdi*" in the Paris Museum, described as "provenant de Panama." His illustrations at once suggested that this was another example of *T. dowi*; and on applying to Professor Milne-Edwards I was supplied with drawings of the fronto-nasal region, which proved that this was the case. I also learned from M. Milne-Edwards that the skin to which this skull belonged is also preserved in the French national collection, that they had been obtained in exchange from the British Museum, and that the locality of Panama was given on the authority of the late Dr. Gray. After some trouble I ascertained that the specimen in question had been originally obtained by the British Museum through Mr. Salvin; and I learn from that gentleman that it was sent to him from Costa Rica by J. Carmiol, who distinctly stated in his letter that it was the *Danta* of the Atlantic coast of that State. My suggestion that the two forms might represent one another on the opposite slopes of the watershed is thus negatived, and it is evident that they are found together, at least in some districts; for, as stated above, Baird's Tapir has also been received from the Atlantic coast of Costa Rica. The exact distribution of the two animals must be left for future investigation; but, as I have already remarked, the range of Dow's Tapir appears to be more restricted than that of its ally, not extending, as far as we know at present, either into Mexico or Panama.

Messrs. Godman and Salvin send me the following notes on the Tapirs of Guatemala, which may refer in part to the last species:—

"Tapirs are found in the forests of both sides of the Cordillera; but they are not met

with in the mountainous interior, where the forests are of smaller extent or give place to open savanas, or to tracts of pines or oaks—virgin forest or older tracts of second-growth woods being apparently essential to their economy. During the whole of our stay in Guatemala we were very unfortunate in never being able to obtain a specimen ourselves, nor were our native hunters more successful. We first found ourselves in their haunts when spending a few days at Yzabal, the port of Guatemala, situated on the lake of the same name. Our morning excursions in pursuit of birds took us in a canoe along the shores of the lake, and into the small creeks which entered the forest at various places. On the muddy banks of these creeks the unmistakable footprints of Tapirs were seldom absent, being sometimes so numerous and fresh that one or more animals must have been very recently in our vicinity. We never, however, saw one; and our stay was too short to organize any serious pursuit of them.

"We next came across Tapirs in a very different country, though situated in what is probably the same range of forest and on the same watershed. This was in the high mountainous district of Santa Cruz, which is reached in a short day's journey from the village of San Gerónimo in Vera Paz. We had gone thither to explore the district; and the day previous to our arrival a native had hunted and killed two Dantas close to where we took up our quarters. We had the melancholy satisfaction of tasting their flesh, but the animals had been chopped up before we even heard of their capture. Santa Cruz, the elevation of which is about 6000 feet above the sea, was clothed, at the time of our visit, with dense virgin forest with occasional clearings; and Tapirs were said to be not uncommon. The hunters told us that when pursued they would rush down the mountain-side for a long distance until they reached water, in which they would stand at bay. They have regular paths in the forest, one of which we followed for some distance. The flesh of the Tapir is dark-coloured and rather strongly flavoured, and probably most appreciated by hungry hunters in the mountain air of Santa Cruz.

"We have no notes of the occurrence of Tapirs in the forests of Northern Vera Paz; nor did we meet with any sign of them on the road to Peten, though forests and water such as they love were there in plenty.

"On the Pacific coast Tapirs are no doubt abundant. In the forests of the hacienda of El Overo, a few leagues from the port of San José, the proprietor, Don Juan Viteri, assured us that they were to be found in plenty. He it was, we believe, who supplied Captain Dow with the original specimens of *T. dowi*. We also had tidings of this animal in various other parts of this coast; but none ever came actually under our own observation, except on one occasion. Early in 1874 Salvin was staying at one of the coffee-plantations at San Augustin, a cultivated tract on the slopes of the Volcano of Antitlan, situated between 2000 and 3000 feet above the sea. An excursion to ascend the mountain had been arranged, and a camp pitched in the forest at a height of about 6000 feet on a sharp spur between two deep ravines. Two native hunters with their dogs were with the party, and after the camp was formed Salvin proceeded up the crest of

the spur with the view of tracing a route for the following day. He took a Danta-track, unmistakable signs of the presence of which animals were about; and the hunters and their dogs followed. He had not gone far when the dogs drew ahead and the hunters after them, when of a sudden a shout was heard, then a shot, and the next moment a Danta dashed past tossing its head, and plunged down the mountain-side, dogs barking and men shouting and yelling after it. These sounds gradually grew fainter, till at last two shots were heard, and we were congratulating ourselves on the capture of a Tapir at last. Long after dark the hunters returned to our camp, bringing with them not a Tapir, but an old and young White-lipped Peccary, which they had met with and secured when in pursuit of the other animal. As for the Tapir, it would not stop, they said, till it came to water, and there was none near. One of the dogs followed it, and was away all night; but in the early morning it crept back to our camp fire—in the absence of its master it had given up the hunt as hopeless."

Our Plate represents the full-grown but not quite adult specimen in the Paris Museum.

Suborder II. ARTIODACTYLA.

The Even-toed Ungulates of Central America show an almost equal mingling of Neotropical and Nearctic forms. Thus *Dicotyles* belongs essentially to the former fauna, although one species ranges some way into North America; while *Ovis* and *Antilocapra*, characteristic Nearctic types, are found in the extreme north of our subregion. The Deer of the genus *Cariacus* are common to both regions, and species belonging to both faunas are represented in Central America.

Fam. I. SUIDÆ.

I. DICOTYLES.

Dicotyles, G. Cuvier, Règne An. i. p. 237 (1817).

The only existing American Pigs constitute a genus apart, differing from *Sus* and the other Old-World genera in several important particulars. They have only four upper incisors, and only three premolars on each side above and below; their median metacarpals and metatarsals are ankylosed into cannon-bones; and a curious odorous gland opens on the middle of the back. This was mistaken by the old travellers for a second navel, a popular error which suggested to Cuvier the name *Dicotyles*.

The two known species of Peccary were first distinguished by Azara*, and both are found in Central America. They may be easily recognized by the following differences in size and colour :—

* Quad. de la Prov. du Paraguay (1801), i. pp. 18, 25.

1. *D. tajacu.* Colour dark grey, with a white or whitish band passing across the chest from shoulder to shoulder. Length of head and body about 36″.
2. *D. labiatus.* Colour blackish, with the lips and lower jaw pure white. Length of head and body about 40″.

Cranial characters have also been pointed out by Dr. Krauss, based on the comparison of a considerable number of skulls*. In captivity they have been known to interbreed; a hybrid between a male *D. labiatus* and female *D. tajacu* was born in the Zoological Society's Gardens in 1864†.

1. Dicotyles tajacu.

Sus tajacu, Linnæus, Syst. Nat. i. p. 103 (1766, descr. orig.)[1]‡.

Dicotyles tajaçu, Sclater, List Vert. An. Zool. Soc. 1st ed. (1862) p. 19[2].

Dicotyles torquatus, Cuvier, Règne An. i. p. 237 (1817, ex Azara)[3]; Baird, Mamm. N. Am. p. 627[4]; Rep. U. S. Mex. Bound. Surv. ii. Mamm. p. 50[5]; Sclater, P. Z. S. 1860, p. 206[6]; Tomes, P. Z. S. 1861, p. 287[7]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 296[8]; Dugès, La Nat. i. p. 138[9].

Quauhtlacoymatl, Quapizotl, Aper Mexicanus, Coyametl, Hernandez, Rer. Med. Nov. Hisp. p. 637; De Quad. Nov. Hisp. fol. 8, cap. xxvi.

Moran[5], *Jabali*[9], of Mexicans.

Coche de Monte of Guatemalans.

Sajino of Costa-Ricans[8].

Hab. North America, from the Red River of Arkansas southwards[4].—Mexico, Guanajuato, Guadalajara (*Dugès*[9]); British Honduras (*Temple*[6]); Guatemala, Dueñas (*Salvin, Mus. Brit.*[7]); Costa Rica (*Frantzius*[8]); Panama (*Viv. Zool. Soc.*).—South America to Patagonia[3].

The Collared Peccary has a very extensive range in the New World, going as far north as 36° North latitude on the Red River of Arkansas, and as far south as 40° South latitude on the Rio Negro of Patagonia. In its habits, which have been well described by Azara and by subsequent writers, it differs considerably from its congener, *D. labiatus*. It does not go in great droves, but is found singly or in pairs, or at most in small parties of from eight to ten; and it is a comparatively harmless animal, not being inclined to attack other animals or human beings.

* Arch. f. Naturg. xxix. 1, pp. 271–280.

† List Vert. An. Zool. Soc. (7th ed.) p. 121.

‡ Audubon and Bachman very strangely state that "it is impossible to ascertain" to which species of Peccary Linnæus applied the name of *Sus tajacu* (Quad. N. Am. i. p. 240). They cannot have read his description, which leaves not the slightest room for doubt; and yet almost every subsequent author has followed them in using Cuvier's name instead of the Linnæan one, which appears to have been first restored by Mr. Sclater[2].

In Central America the Peccary was first noticed by Hernandez, under the euphoneous titles quoted above. In the seventeenth century Lionel Wafer gave the following quaint account of it in his 'Description of the *Isthmus* of *America*':—

"The Country has of its own a kind of Hog, which is called *Pecary*, not much unlike a *Virginia* Hog. 'Tis black, and has little short Legs, yet is pretty nimble. It has one thing very strange, that the Navel is not upon the Belly, but the Back: and what is more still, if upon killing a *Pecary* the Navel be not cut away from the Carcass within 3 or 4 Hours after at farthest, 'twill so taint all the Flesh, as not only to render it unfit to be eaten, but make it stink insufferably. Else 'twill keep fresh several Days, and is very good wholesome Meat, nourishing and well tasted. The *Indians barbecue* it, when they would keep any of it longer: The Manner in which they do it I shall describe elsewhere. These Creatures usually herd together, and range about in Droves; and the *Indians* either hunt them down with their Dogs, and so strike them with their Lances, or else shoot them with their Arrows, as they have Opportunity"*.

At the present day the Collared Peccary appears to be abundant in all the Central-American States. Messrs. Godman and Salvin inform me that "in Guatemala this species is more often met with in the low-lying forests than in the less heavily timbered higher country; but even in the mountains it is not uncommon in suitable localities, such as the forests of the Volcan de Fuego, to a height of 7000 or 8000 feet, and the Santa-Cruz range in Vera Paz, at an elevation of 6000 feet. In the latter district the Indians hunt these animals with dogs. The hunters stand behind trees at the side of a path likely to be followed by a Peccary when pursued, and stab it as it rushes by. The afternoon of the day on which we reached Santa Cruz we met an Indian carrying on his back a *Coche de Monte* which had been killed in this way; but in the death-struggle the brute had seized the man's hand and pinned it to the handle of his knife, causing severe lacerated wounds. In Guatemala the Collared Peccary is usually seen in parties of five or six individuals in the forest, but in the early morning they trespass into the clearings."

Dr. v. Frantzius says that in Costa Rica this species is known by the name of *Sajino*, and is found on the central plateau up to an elevation of 8000 feet. It is hunted by the Costa-Ricans, both on account of its excellent flesh and because it does much damage to the maize-fields[8].

2. **Dicotyles labiatus.** (Tab. X.)

Dicotyles labiatus, Cuvier, Règne An. i. p. 238 (1817, ex Azara)[1]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 296[2].

Cariblanco of Costa-Ricans[2].

Warree of Indians.

* Dampier's Voyages, iii. p. 328.

Hab. British Honduras (*Temple*); Guatemala, forests of Northern Vera Paz, Volcan de Atitlan (*Salvin & Godman*); Nicaragua (*Belt*); Costa Rica (*Frantzius*[2]).—South America to Paraguay[1].

As has been already remarked, the White-lipped Peccary was first scientifically described by Azara, and systematically named by Cuvier[1]; but it was well known as a distinct species to the older voyagers to Central and South America. Lionel Wafer thus distinguished it in 1681:—

"The *Warree* is another kind of Wild-Hog they have, which is also very good Meat. It has little Ears, but very great Tusks; and the Hair or Bristles 'tis covered with are long, strong and thickset, like a coarse Furr all over its Body. The *Warree* is fierce, and fights with the *Pecary*, or any other Creature that comes in his way. The *Indians* hunt these also as the other, and manage their Flesh the same way, except only as to what concerns the Navel; the Singularity of which is peculiar to the *Pecary*"*.

The range of this species is considerably less extensive than that of the Collared Peccary; it does not appear to go further south than Paraguay, and the most northern locality hitherto recorded is British Honduras. Mr. R. Temple, Chief Justice of Belize, gave a good description of the "Warree" of that colony in a letter to Mr. Sclater, and added the following spirited sketch of its pugnacious habits:—

"The Warree is a far more ferocious animal than the Peccary; but his courage perhaps may arise from a principle not quite a stranger to the human breast—a consciousness of being well supported; for, as I have said, they are always seen in multitudes. If you meet a flock of Warrees in the bush, and you take no notice of them, it is probable that they will take no notice of you. But if your intentions are hostile, and your design is to transfer one of them from his native wilderness to your kitchen, you must take care to place yourself in a safe position before you carry your design into execution. A gentleman, not long since, shot a Warree without having taken the necessary precautions; the remainder of the flock instantly pursued him, and if he had not managed to climb into a tree he would have been torn in pieces. But he was kept a prisoner in that leafy asylum for many hours, the surviving Warrees being bent on revenging the death of their companion. Even when the flock went a little distance to feed, they left two or three to stand guard at the foot of the tree. The hunter has no difficulty in tracing the Peccary and the Warree by the strong odour which prevails wherever they have been"†.

In Guatemala, Messrs. Godman and Salvin inform me that the Warree is found in the vast forests of Northern Vera Paz, which are, in fact, an extension of those of British Honduras, just spoken of. Here these animals go about in large droves, and have the habits attributed to them elsewhere. "On the Pacific side of Guatemala this species is

* Dampier's Voyages, iii. pp. 328, 329. The last statement as to the dorsal gland is of course erroneous.

† P. Z. S. 1860, pp. 206, 207.

also found, though probably in fewer numbers. The two Warrees, female and young, killed by the Tapir-hunters, as already mentioned*, were met with at an elevation of upwards of 5000 feet above the sea in the forest-clad slopes of the Volcan de Atitlan. No others were with them, the drove being probably at some distance off; the females with their young broods probably keeping apart from the herd until the latter are of a sufficient size to shift for themselves. The young one in the present case was about a quarter grown, and clothed in the rich russet hair peculiar to young animals of this family."

The late Mr. Belt was evidently unacquainted with the difference between the two species of Peccary; for he gave the name of *D. tajacu* to the "Wari" of Nicaragua, of whose habits he gives the following account:—"These Wari go in herds of from fifty to one hundred. They are said to assist one another against the attacks of the Jaguar, but that wary animal is too intelligent for them. He sits quietly on the branch of a tree till the Wari come underneath, then, jumping down, kills one by breaking its neck; leaps up into the tree again, and waits there until the herd depart, when he comes down and feeds on the slaughtered Wari in quietness"†.

In Costa Rica, Dr. v. Frantzius informs us that the White-lipped Peccary is found in great droves in the thick primeval forests of the warmer lowlan ds, but is also met with occasionally in the higher-lying mountain-woods, as at Cariblanco, near the Sarapiqui. This place takes its name from the tradition that the early settlers were disturbed in the first night of their encampment by a herd of these Peccaries rushing by, *Cariblanco* (white face) being the common name of this species in Costa Rica[2].

Fam. II. BOVIDÆ.

1. OVIS.

Ovis, Linnæus, Syst. Nat. i. p. 97 (1766).

Two genera of hollow-horned Ruminants are represented in our subregion by characteristic Nearctic types, which just cross its northern boundary, while a third has recently been exterminated.

Of the genus *Ovis* the New World has only a single species, *O. cervina*, more generally known by the name of *O. montana*. Some authors have regarded it as identical with the North-Siberian Wild-Sheep, *O. nivicola*, Eschscholtz ‡; but its distinctness is generally recognized by zoologists, and it appears to differ constantly in colour, in cranial proportions, and in the curves of the horns.

* *Anteà*, p. 105. † 'Naturalist in Nicaragua,' p. 30.

‡ As Middendorff (Reise Sibir., Säugeth. pp. 116–118) and others.

1. Ovis cervina.

Ovis montana, Cuvier, Règne An. i. p. 267 (1817, ex Geoffroy, nec Ord)[1]*; Baird, Mamm. N. Am. p. 673[2]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 52[3].
Ovis cervina, Desmarest, Nouv. Dict. d'Hist. Nat. xxi. p. 553 (1818, ex Geoffroy)[4].
Borrego cimaron of Mexicans[3].
Tenatzali, Tajé of Indians[3].

Hab. North America, Rocky Mountains from Upper Missouri and Yellowstone southwards[2].—Mexico, Sonora (*Schott*[3]).

The range of the "Big-horn," or Mountain Sheep of North America, extends into Sonora, where the species was found not unplentifully by the naturalists of the United-States Boundary Survey. Mr. A. Schott remarks that the differences of the state of drainage in that region appear to determine the distribution of the various Ruminants. "Thus the Common Deer belongs to the more shady lowlands, the Mule Deer to the uplands, the Antelope ranges over the open mountain table-lands; whilst the Mountain Sheep has its home on the rugged crests of the waterless sierras of North-western Sonora and New Mexico."

Mr. Schott also notices that the curious story as to the Big-horn's power of leaping over precipices, and saving itself by alighting on its massive horns, is firmly believed by the native hunters. "It is also not a modern invention, for Clavigero mentions the same as he heard it from the lips of the Californian Indians"[3].

[BISON.]

In his admirable and exhaustive memoir on 'The American Bisons, Living and Extinct'†, Mr. J. A. Allen gives satisfactory evidence of the former extension of the range of the so-called Buffalo, *Bison americanus* (Gmelin), to the south of the Rio Grande. It is true that the notices of Hernandez and other medieval writers may refer to the old province of Quivira, which lay far to the north of the present boundary of Mexico; but the evidence collected by the late Dr. Berlandier, and contained in his manuscripts now in the Smithsonian Institution, leaves no doubt that the annual southward migration of the Bison formerly extended far south of the present United-States frontier. There is sufficient proof of its former range, says Mr. Allen, "over the north-eastern provinces of

* It is with great regret that I feel obliged to change the well-known name of the American Wild-Sheep, but no choice is left to any one who accepts the fundamental law of priority. *Ovis montana* of Ord (Guthrie's Geogr. (2nd Am. ed.) pp. 292, 309 [1815, descr. orig. fide Baird]; Journ. Ac. Philad. i. [1817] p. 8) is indisputably the Rocky-Mountain Goat, which now properly stands as *Aplocerus montana* (Ord). It is evident, therefore, that the name *Ovis montana* cannot be applied to any other animal.

† Mem. Mus. Comp. Zool. Harvard Coll. iv. no. 10, pp. 1–246, pls. i.–xii. (1876); also simultaneously issued as Mem. Geol. Surv. Kentucky, i. pt. 2; and reprinted in Rep. U.S. Geol. and Geogr. Surv. of Territories for 1875, pp. 443–587.

Mexico, including certainly portions of the present States of Tamaulipas, Nuevo Leon, Cohahuila, Chihuahua, and Durango. It thus extended southward to at least the 25th parallel. It seems not, however, to have been abundant over much of this region, and to have been mainly extirpated prior to the beginning of the present century."

Fam. III. ANTILOCAPRIDÆ.

1. ANTILOCAPRA.

Antilocapra, Ord, Journ. de Phys. lxxxvii. p. 149 (1818).
Dicranocerus (subgen.), Hamilton-Smith, Griffith's An. King. v. p. 312 (1827).

The second hollow-horned Ruminant which is now to be met with within our limits is the Prong-buck or Prong-horn, a very aberrant form, which is highly characteristic of the western Nearctic fauna, but extends its range into the northern provinces of Mexico.

Although the fact that the Prong-buck sheds it horns annually was long well known to hunters and backwoodsmen, and had been noted by one or two writers, yet it was generally disbelieved or ignored by zoologists; and Mr. Bartlett, the observant Superintendent of the Zoological Society's Gardens, was the first to demonstrate its truth and insist on its importance. Attention being thus directed to the subject, it was proposed almost simultaneously by Mr. Sclater and the late Dr. Gray that the Prong-horn should be regarded as the type of a distinct family, Antilocapridæ; and this view is confirmed by the observations of Dr. Murie, to whom we are indebted for a careful description of its anatomy *.

1. Antilocapra americana.

Antilope americana, Ord, Guthrie's Geogr. (2nd Am. ed.) ii. pp. 292, 308 (1815, descr. orig., fide Baird)[1].
Antilocapra americana, Baird, Mamm. N. Am. p. 666[2]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 51[3]; Caton, Ant. & Deer Am. p. 21[4].
Teuthtlalmaçame, Hernandez, Rer. Med. Nov. Hisp. p. 325.
Berendo of Mexicans[2].

Hab. North America, west of the Missouri, from the Saskatchewan southwards[2].—Mexico, Sonora, Chihuahua (*Kennerly*[3]), Tamaulipas (*Berlandier*[2]).

* On this very interesting subject the following authors may be consulted:—Cassin, U.S. Expl. Exped. p. 63 (1858); Weinland, Zool. Gart. 1863, p. 255; Martin, op. cit. 1864, pp. 254–256; Bartlett, P. Z. S. 1865, pp. 718–725; Canfield, op. cit. 1866, pp. 105–110; Sclater, Rep. Brit. Assoc. 1866, pp. 77, 78; id. Ann. & Mag. Nat. Hist. (3rd ser.) xviii. pp. 401–404; Gray, tom. cit. pp. 323–326, 468, 469; Murie, P. Z. S. 1870, pp. 334–368; Gervais, Journ. de Zool. iv. pp. 263–266; Caton, Amer. Nat. x. pp. 193–205; id. Antelope and Deer of America, pp. 21–37; Giebel, Zeitsch. d. ges. Naturwiss. li. pp. 856–861; Cope, Amer. Nat. xii. p. 557. The last-named writer denies that the shedding of the horns is periodical or even frequent; but on this point Judge Caton's observations seem to leave no room for doubt.

The naturalists of the United-States Boundary Survey found the Prong-horn to be abundant in the north of Mexico, being especially plentiful in the northern part of Sonora, where Dr. Kennerly observed that it was less shy than in other localities. Mr. Clark states that in this region "the Antelope is said to have an abiding hatred for the rattle-snake, which it decoys first into a striking attitude, and then utterly annihilates by leaping into the air and coming down upon the snake with its four sharp-cutting hoofs placed together"[3]. According to the Berlandier manuscripts, this is the *Teuhtlalmaçame* of Hernandez and the *Berendo* of modern Mexicans, and extends its range southwards at least throughout the State of Tamaulipas[2].

For the most recent account of the habits and mode of living of this very interesting animal, the reader may be referred to Judge Caton's excellent monograph[4].

Fam. IV. CERVIDÆ.

1. CARIACUS.

Mazama (subgen.), Hamilton-Smith, Griffith's An. Kingd. v. p. 314 (1827, nec Rafinesque*).
Cariacus, Gray, P. Z. S. 1850, p. 237; Brooke, P. Z. S. 1878, p. 918.

Sir Victor Brooke, in his recent review of the Cervidæ †, has shown that the existing Deer may be naturally divided into two groups, according to the characters of the rudimentary lateral metacarpal bones, and that this division is in singular accordance with the geographical distribution of the family. The first section, *Plesiometacarpi* (or subfamily Cervinæ, as I would prefer to call it) is almost exclusively Old-World, and is characterized by having only the *proximal* ends of the metacarpals remaining. The *Telemetacarpi* (or Cariacinæ), on the other hand, retain only the *distal* extremities of these bones, and are mostly either New-World or circumpolar forms.

Four species of the typical American genus *Cariacus*, representing the subgenera *Cariacus* proper and *Coassus*, are natives of our subregion. Of these the first, *C. macrotis*, is a Nearctic form which just crosses our northern boundary; the second, *C. virginianus*, extends its range from Canada to Panama, if not far into South America; the third, *C. toltecus*, appears to be peculiar to Southern Mexico; while the fourth, *C. rufinus*, is a strictly Neotropical type. The following characters may serve to distinguish these species:—

* *Mazama* of Rafinesque was an imaginary genus, allied to the Giraffe, and possessing simple solid and permanent horns! He founded it mainly on the "Temamazame" of Hernandez, *Cariacus rufinus*, with which he associated the animals now known as *Antilocapra americana* and *Aplocerus montanus* (Amer. Monthly Mag. ii. p. 44, 1817, fide Baird). It is evident that such a genus cannot be retained either as a whole or as restricted to any of its members, no one of which agrees with its definitions. Cf. Baird, Mamm. N. Am. p. 665; de Saussure, Rev. et Mag. Zool. 1860, p. 251, footnote.

† "On the Classification of the Cervidæ," P. Z. S. 1878, pp. 883–928; pl. lv.

1. *C. macrotis.* Anterior and posterior portions of antlers both branched; metatarsal gland on *upper* portion of metatarsus, 4″ to 6″ long, covered with tawny hairs. Coat dark grey; tail white, with a black tip. Length of head and body 60″ to 70″.
2. *C. virginianus.* Antlers curved forwards, with tines on their upper posterior surface; metatarsal gland on *lower* portion of metatarsus, ½″ to 1″ long, surrounded with white hairs. Coat tawny grey or reddish; face dark; tail long, tapered, grey above, white beneath. Length 55″ to 65″.
3. *C. toltecus.* Antlers short, upright, nearly straight, and semipalmate, with basal and terminal tines; metatarsal gland *absent.* Coat "dark chestnut-brown," face blackish, belly white; tail long, truncated, brown above, white below. Length 40″ to 46″.
4. *C. rufinus.* Antlers simple spikes; metatarsal gland *absent.* Coat bright rufous, passing into blackish brown on the face and legs; lighter, but not white, beneath. Length about 30″.

1. Cariacus macrotis.

Cervus macrotis, Say, Narr. Long's Exped. ii. p. 88 (1823, descr. orig. [fide Baird])[1]; Baird, Mamm. N. Am. p. 656[2]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 51[3]; Caton, Antelope and Deer of Amer. p. 93[4].

Cariacus macrotis, Brooke, P. Z. S. 1878, p. 921[5].

? *Aculliame,* Hernandez, Rer. Med. Nov. Hisp. p. 325.

Hab. North America, west of Missouri River, from British Columbia southwards[4].—Mexico, Corralitos, San-Luis Mountains, Sierra Madre (*Kennerly*[3]).

The well-known Mule Deer, or Black-tailed Deer, of the Western United States extends its range into the northern provinces of Mexico, where it was observed by the naturalists of the Boundary Survey in the States of Chihuahua and Sonora. Of its distribution there Dr. Kennerly observes that the members of the Survey did not meet with it till they reached the valley of the Corralitos River, and even there it was not very common. In the San-Luis Mountains and the Sierra Madre, however, it was very numerous, being at least as plentiful as the Virginian Deer; but it was remarked to be more easily disturbed and driven from its accustomed haunts than that species. "It is somewhat curious that we did not observe the Black-tailed Deer after leaving the Sierra Madre, although it is found in great numbers in California. The belt of country traversed by us, included between that mountain and the 111th meridian, seemed to be almost if not entirely without this animal, while in several localities the Virginian Deer and Antelope were both very common"[3]. I have been unable to trace the occurrence of the Mule Deer further to the south; and as it appears

to have been unknown to Drs. Berlandier and Dugès, and to M. de Saussure, it is not probable that it ranges far into Mexico.

2. Cariacus virginianus.

Cervus virginianus, Boddaert, Elench. Anim. i. p. 136 (1785, ex Pennant)[1]; Baird, Mamm. N. Am. p. 643[2]; Rep. U.S. Mex. Bound. Surv. ii., Mamm. p. 50[3]; Caton, Ant. & Deer Am. p. 100[4].

Cariacus virginianus, Brooke, P. Z. S. 1878, p. 919[5].

Cervus mexicanus, Gmelin, Linn. Syst. Nat. i. p. 179 (1788, ex Pennant*)[6]; Lichtenstein, Darst. neu. Säugeth. pl. xviii.[7]; Baird, Mamm. N. Am. p. 653[8]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 50[9]; de Saussure, Rev. et Mag. Zool. 1860, p. 242[10]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 299[11]; Dugès, La Nat. i. p. 138[12].

Cariacus mexicanus, Brooke, P. Z. S. 1878, p. 919[13].

Cervus nemoralis, Hamilton-Smith, Griffith's An. Kingd. iv. p. 137, pl. (1827, descr. orig.)[14].

? *Cervus capricornis*, de Saussure, Rev. et Mag. Zool. 1860, p. 528 (descr. orig.)[15].

? *Cervus* (*Cariacus*) —?, Moore, P. Z. S. 1859, p. 51[16].

? *Quauhtlamaçame*, Hernandez, Rer. Med. Nov. Hisp. p. 325.

Venado of Spanish Americans (common to the other species).

Hab. North America from Canada and British Columbia southwards[4].—Mexico (*v. Sack, Mus. Berol.*[7]), Sonora (*Kennerly, U.S. Nat. Mus.*[9]), Guanajuato (*Dugès*[12]), Cordova, Orizaba (*de Saussure*[10]), Oaxaca, Vera Cruz (*Sallé, Mus. Brit.*); Guatemala (*Godman & Salvin, Mus. Brit.*[13]); Honduras (*Leyland*[16], *Salvin*[13]); Nicaragua (*Belt, Salvin*[13]); Costa Rica (*Frantzius*[11]; *Carmiol, Mus. Brit.*); Panama (*Salvin*[13]).—South America to Guiana and Peru ?[13].

As already observed, I feel myself compelled to follow the example of the more recent American writers in rejecting the claims of the Mexican Deer to constitute a distinct species from *Cariacus virginianus*. Its only distinctive characters lie in its smaller size and comparatively simple antlers, and in its not presenting the seasonal change of colour observable in the northern animal; but in all these points there appears to be a regular intergradation, the Deer of Texas and the Gulf States being strictly intermediate. Sir Victor Brooke, although keeping the forms provisionally distinct, expresses the opinion that not only *C. mexicanus*, but also the South-American *C. similis*, *C. savannarum*, and *C. peruvianus* will probably prove to be "nothing more than climatic varieties of *C. virginianus*, connected inseparably by every shade of intermediate forms," and that they thus present another illustration of Mr. Allen's law of the decrease in size of Nearctic types in their range to the southward†. Of *C. mexicanus* he remarks that "there are not more than six points, inclusive of the brow-antler, on both antlers

* Sir Victor Brooke remarks that "the description and dimensions given by Pennant [Hist. Quad. i. p. 110 are reconcilable with the *Cervus mexicanus* of Lichtenstein; but the antlers figured by him (pl. xi. fig. 3) are certainly not referable to the same form. They appear rather to represent abnormal antlers of *Cariacus macrotis*" (P. Z. S. 1878, p. 919). It seems to me more probable that these antlers belonged to *C. leucurus* (Dougl.), which recent American zoologists consider to be a local race of *C. virginianus*; they much resemble the remarkable Nebraska head figured by Baird (Mamm. N. Am. p. 652, fig. 18).

† P. Z. S. 1878, p. 920.

in any of the specimens collected between Guatemala and Panama; but I have seen specimens from Mexico and Texas with eight and ten tines; and one splendid specimen collected by Mr. Dresser near Friedrichsburg in Texas has as many as fifteen. The Texan Deer are decidedly larger than those inhabiting Guatemala, Nicaragua, and Panama" [13]. No better proof of the complete gradation of these varieties can be given than the fact that zoologists do not know to which form the Texan Deer should be referred: Professor Baird treated them as *C. virginianus*, placing the geographical limit of the species near the United-Sates and Mexican Boundary [2]; while Sir Victor Brooke regards them as *C. mexicanus* and moves the line of demarcation to the River Missouri [13]! Of the other names quoted in the synonymy, there can be little doubt of the correctness of Sir Victor's reference of Hamilton-Smith's *Cervus nemoralis* [14] to the present species; and it appears to me to be more than probable that the *Venado cuernicabra* of the Mexican hunters, to which M. de Saussure gave the provisional name of *C. capricornis* [15], is merely founded on individual varieties of *C. virginianus* with simple antlers, similar to forms which are well known in other species of Deer.

The Virginian Deer seems to be regularly distributed and far from uncommon in Central America. Dr. Kennerly remarks that in Northern Mexico it is particularly numerous, both in the valleys and among the mountains, especially in the neighbourhood of Santa Cruz [9]; and M. de Saussure says that it is very common in all the wooded parts of the Republic [10].

In Guatemala Messrs. Salvin and Godman found this Deer nearly everywhere they went. They inform me that "It is not only widely distributed over the country, but has also a great range in altitude where it finds suitable localities. A shed horn, partly nibbled, was picked up by us in the extinct crater of the peak of the Volcan de Fuego, called Acatenango, at an elevation of over 13,000 feet above the sea; and traces of Deer were not unfrequently seen on the grassy pine-clad slopes of the mountain, down to a height of 10,000 feet where the dense forest-zone commences. On the open pastures of Calderas (7000 feet) this species is not uncommon; and we frequently met with it in the neighbourhood of Dueñas, especially during the dry season, when Deer would come to drink in the river or the outfall of the Lake of Dueñas. The Indians of this district often hunt them at this time of year on Sundays or feast days. The active male population of a village, with curs of every degree, turn out on such an occasion, and after finding a Deer they hunt it over hill and plain till the animal is fairly run down and killed. Often a whole morning is occupied in the pursuit; but the Indians, accustomed as they are to long journeys on foot carrying heavy loads, never tire, and seldom fail to secure their prey. Indians who have guns also secure Deer by lying in wait at the pools of water which they frequent.

"In other parts of Guatemala Deer are equally common, as at San Gerónimo and elsewhere in Vera Paz; but perhaps they were nowhere more abundant than at Huamuchal, near the Pacific Ocean, close to the Mexican frontier. A day here seldom passed without one or more being seen.

"Indians keep the horns and place them about their ranchos to hang things on. Numbers of horns were brought us which, judging from their smoked state, must have done duty as pegs for many years. We believe that Deer-hides are exported from Guatemala, but in comparatively small numbers. From the various ports of Nicaragua many bales are annually sent to the American or European markets."

The above remarks on the Indians hunting Deer, and using their antlers as pegs, are interesting when compared with Lionel Wafer's account of the habits of the Darien Indians two centuries ago. "They have," he says, "considerable Store of *Deer* also, resembling most our *Red Deer*; but these they never hunt nor kill; nor will they ever eat of their Flesh, though 'tis very good; but we were not shy of it. Whether it be out of Superstition, or for any other Reason that they forbear them, I know not: But when they saw some of our Men killing and eating of them, they not only refus'd to eat with them, but seem'd displeas'd with them for it. Yet they preserve the Horns of these Deer, setting them up in their Houses; but they are such only as they shed, for I never saw among them so much as the Skin or Head of any of them that might show they had been kill'd by the *Indians*; and they are too nimble for the *Warree*, if not a Match for him" *.

In Nicaragua, too, times have changed for the worse for the Deer. The late Mr. Belt visited the cabin of a native hunter, who used a trained ox as a stalking-horse to cover his approach to the herd; and game was so plentiful that he generally brought home two Deer, the skins of which averaged about five pounds in weight and sold for twenty cents per pound. "It is astonishing that the Deer should be so little afraid of man as they are, after having been objects of chase for probably thousands of years. Sometimes when one is encountered in the forest, it will stand within twenty yards, stupidly gazing at a man, or perhaps striking the ground impatiently with its fore foot, and sometimes waiting long enough for an unloaded gun to be charged" †. Dr. v. Frantzius says that in Costa Rica the *Venado* inhabits the borders of the virgin forests and sometimes does great damage in the neighbouring maize-fields. The adult bucks, which are called *Capatanes* or captains, on account of their leading the herds, are extremely shy, and are consequently rarely killed by the hunter [11].

3. **Cariacus toltecus.**

Cervus toltecus, de Saussure, Rev. et Mag. Zool. 1860, p. 247, pl. xv. fig. 1 (descr. orig.)[1].
Cariacus toltecus, Brooke, P. Z. S. 1878, p. 921[2].
Cervus yucatanensis, Hays, Ann. Lyc. New York, x. p. 218, pl. x. (1874, descr. orig.)[3].
Cervus acapulcensis, Caton, Ant. & Deer Am. p. 113 (1877, descr. orig.)[4].

Hab. Mexico, Acapulco (*Hassler Exp.*, *Mus. Coll. Harv.*[4]), Orizaba (*de Saussure*[1]), Yucatan (*Hays*[3]).

* Dampier's 'Voyages,' iii. p. 329.

† 'Naturalist in Nicaragua,' pp. 252, 253.

So long ago as 1851 Audubon and Bachman made incidental mention of a small Deer from Yucatan and Southern Mexico in which the metatarsal gland was absent*; and nine years later M. de Saussure gave the name of *Cervus toltecus* to a small Cervine skull obtained near Orizaba[1]. In a paper read before the New-York Lyceum of Natural History in 1872, Mr. W. J. Hays described a small Deer without metatarsal tufts as *Cervus yucatanensis*[3]; and in 1877 Judge Caton, who probably was not acquainted with Mr. Hays's paper, gave the name of *Cervus acapulcensis* to what is evidently the same form[4]. The dimensions of M. de Saussure's typical skull would appear to indicate a somewhat smaller animal than is shown by the measurements of the American writers; but in this respect there appears to be considerable latitude. The form of the nearly straight flattened Roe-like antler figured by the Swiss zoologist agrees so well with Messrs. Hays and Caton's descriptions and illustrations as to leave no doubt in my mind that all three types were specifically identical.

Nothing has been recorded of the habits of the Yucatan Deer in its native country; but it appears to be not unfrequently brought alive to the United States, and to thrive in captivity. Mr. Hays remarks that the antlers are shed in the month of March. Judge Caton first met with the species in Woodward's Gardens at San Francisco, and afterwards kept it in his own park, where he obtained hybrids with the Virginian Deer and with another species which he believed to be a native of Ceylon†. Of its habits in captivity he remarks:—"While I cannot charge the Acapulco Deer with having a wicked disposition, it certainly has more courage and combativeness than any of our other Deer, and corresponds in these respects with the Ceylon Deer. . . . . They do not hesitate to attack Deer of the other species three times their size and strength, and beat them by mere force of courage and will"[4].

Mr. Allen informs me that the specimen in the collection of Harvard College is a nearly full-grown female, and agrees in every respect with the characters pointed out by Judge Caton. He adds that "the skull differs very much in its proportions from that of *C. virginianus*, especially in the relative shortness of the facial regions; in other words, the skull is broad and short, as stated by Caton." This agrees well with the measurements of the typical skull of *C. toltecus* as given by M. de Saussure.

4. Cariacus rufinus.

Cervus rufinus, Bourcier & Pucheran, Rev. et Mag. Zool. 1851, p. 561 (descr. orig.)[1]; Pucheran, Arch. du Mus. vi. p. 491, pl. xxx.[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 300[3].
Cariacus rufinus, Brooke, P. Z. S. 1878, p. 925[4].
Cervus sartorii, de Saussure, Rev. et Mag. Zool. 1860, p. 252 (descr. orig.)[5].
? *Cervus* (*Coassus*) — ?, Moore, P. Z. S. 1859, p. 51[6].

* Quad. N. Amer. ii. p. 200.

† What Mr. Caton's "Ceylon Deer" can be I am quite at a loss to know; from what he says it would appear to be a *Cariacus*, in which case there must, of course, be some error as to its nativity.

? *Temamaçame, Maçatl chichiltic,* Hernandez, Rer. Med. Nov. Hisp. p. 325.
Guisisil and *Cabrito del Monte* of Guatemalans.
Cabra del Monte of Costa-Ricans.

Hab. Mexico, Mirador (*Sartorius*[5], *Mus. Darmst.*[3]); Guatemala, Coban in Vera Paz and Pacific coast generally (*Godman & Salvin*); Honduras (*Leyland*[6]); Costa Rica (*Rogers, Mus. Brit.*), Pacaca, Guaitil (*Frantzius*[3]).—South America to Ecuador[1].

The Black-faced Brocket belongs to a small group of species of the Neotropical subgenus *Coassus* which are very closely allied to one another, but appear to differ constantly in size and coloration. Of these it has much the most northern range, extending throughout the greater part of Central America. There appears to be little doubt that it was the *Temamazame* of Hernandez *; and still less that the Mirador skull on which M. de Saussure bestowed the provisional name of *Cervus sartorii*[5] belonged to this species, for Dr. v. Frantzius informs us that two specimens of *C. rufinus* from the same locality have been presented by Herr Sartorius to the Darmstadt Museum[3].

I am informed by Messrs. Godman and Salvin that "The Guisisil, as this little Deer is called throughout the Pacific coast region of Guatemala, is well known to hunters, but, owing to its habits of constantly remaining in the undergrowth of the denser forest, it is an animal not easy to secure. By all accounts it is not uncommon in the forests which spread over the slopes of the volcanoes to the Pacific Ocean, but we only once came across it ourselves; this was in the forests of the sides of the Volcan de Atitlan, about 4000 feet above the sea, when a dog belonging to one of the Indian hunters of our party found a half-decomposed carcass near the track we were following.

"In the neighbourhood of Coban, in Vera Paz, where it is called the Cabrito del Monte, it used to be common; and once we shot a young one in second-growth forest not far from the town. At that time (1861) this Deer, the Coche de Monte (*Dicotyles tajacu*), Tepescuinte (*Cœlogenys paca*), and Agouti (*Dasyprocta punctata*) were the chief ground-game of the Indian hunter. Probably now the animal is more scarce, and one must go further afield to find it."

Further to the south this species is found in the warmer parts of Costa Rica, where it bears the same name of *Cabra del Monte*, or "forest-goat"[3]. South of the Isthmus its range extends through Colombia, whence examples have been received by the British Museum, to Ecuador, where the type specimen was obtained by M. Bourcier[1]. Further south than this its existence has not been established, for Dr. Burmeister's suggested identification with the Brazilian *C. nanus* † of Lund requires confirmation.

Dr. v. Frantzius remarks that the Black-faced Brocket appears to agree in its habits, as well as in the colour of the fawns, with what has been recorded of its Brazilian ally, *C. rufus* (F. Cuvier), by Burmeister and Rengger[3].

* *Cf. suprà*, p. 113, footnote.

† Thiere Brasil. i. p. 319.

Order VII. GLIRES.

Suborder I. SIMPLICIDENTATA.

In this the dominant suborder of Rodents* the aspect of the Central-American fauna is of a very mixed character, Neotropical types preponderating in some groups and Nearctic in others.

In the first section, the Sciuromorpha, this is well illustrated in the Sciuridæ, where we find that our representatives of *Sciurus* are mostly southern forms, that *Tamias* is absent, and that *Cynomys* just crosses our northern boundary; while, on the other hand, such characteristically northern genera as *Sciuropterus* and *Spermophilus* are well established in Mexico. The family Haplodontidæ is not represented; but the Beaver, sole surviving member of the Castoridæ, is found along the Nearctic frontier.

Of the Myomorpha the Muridæ are decidedly Nearctic. Passing over the introduced species of *Mus*, we find that the known Central-American species of *Hesperomys* all belong to the North-American subgenera or sections of that large genus, except a few which appear to be peculiar to the subregion. The allied Nearctic genera *Ochetodon*, *Sigmodon*, *Neotoma*, and *Arvicola* are all represented; while the Neotropical forms *Drymomys*, *Holochilus*, and *Reithrodon* seem to be totally absent. The Geomyidæ probably find their greatest development in Central America, but are also spread over most of North America, whereas only one or two forms are known to extend south of the Isthmus of Panama. The Nearctic family Zapodidæ is not represented.

In the Hystricomorpha we have a characteristic Neotropical type in the Dasyproctidæ, and the only Central-American species of Hystricidæ belongs to the South-American genus *Synetheres*. On the other hand, the great groups which lend such a peculiar character to the Neotropical fauna are either poorly represented or wanting; the large family of Octodontidæ has only a single form, *Myopotamus*, and the Chinchillidæ, Dinomyidæ, and Caviidæ are conspicuous by their absence.

On balancing the affinities of the whole order, the Nearctic types of Rodents must be considered to preponderate in numbers in Central America, notwithstanding the presence of some very characteristic Neotropical forms.

* The arrangement of the Rodents here adopted is essentially that proposed in my paper "On the Classification of the Order Glires" (P. Z. S. 1876, pp. 61–98, pl. iv.).

Fam. I. SCIURIDÆ.

1. SCIUROPTERUS.

Sciuropterus, F. Cuvier, Ann. du Mus. x. p. 126 (1825).

The true Squirrels which are provided with a flying expansion of the skin have been divided into two genera, *Pteromys* of George Cuvier, and *Sciuropterus* of his brother Frédéric—the members of the latter being distinguished by their smaller size, by their flat distichous tails, and by their molars remaining tuberculate through life, instead of being very soon worn down to a flat surface. In reviewing the genera of this order four years ago * I did not accord full generic rank to *Sciuropterus*; but on further consideration I am now disposed to admit its validity, although some Indian species appear to be rather intermediate in their characters. Several minor cranial features, as the breadth of the nasals and the development of the postorbital processes, appear to be constant; and the geographical distribution of the two forms is strikingly different; for *Pteromys* is confined to the Oriental Region, whilst *Sciuropterus*, although extending into India and Central America, is characteristic of the Palæarctic and Nearctic faunæ.

Several species of North-American Flying-Squirrels have been described as distinct; but Mr. J. A. Allen, in his invaluable monograph of the Sciuridæ of that continent †, has shown that only a northern and a southern form exist, and these he regards as varieties of the same species. They show a wonderful amount of geographical variation in size, specimens from the extreme north of the range being more than *one half* larger than examples from the extreme south. In the former the length of the head and body averages over 6 inches, while in the latter it is not more than 6, usually less than 5·50 inches. There are also slight variations in colour, which, however, appear completely to intergrade. I have not sufficient material to form an independent opinion on the value of the differences between the two forms; but in any case the southern Flying-Squirrel will stand as *Sciuropterus volucella* (Pallas), while the northern, if regarded as distinct, will be *S. hudsonius* (Gmelin) ‡.

1. Sciuropterus volucella.

Mus volans, Linnæus, Syst. Nat. i. p. 85 (1776, ex Ray, nec *Sciurus volans*, Linnæus, tom. cit. p. 88) §[1].

* P. Z. S. 1876, p. 76.

† In Coues and Allen's "Monographs of North-American Rodentia," Report U.S. Geol. Surv. of the Territories, vol. xi. (1877).

‡ The works of Pallas (Nov. Sp. Glir.) and of Gmelin (Syst. Nat. i.) are both dated 1788; but the former is quoted in the latter, and must consequently have been first published.

§ *Mus volans* is founded on the *Sciurus americanus volans* of Ray, while *Sciurus volans* (ex Seba) is the

Sciurus volucella, Pallas, Nov. Sp. Glir. p. 351 (1778, descr. orig.)[2].
Pteromys volucella, Baird, Mamm. N. Am. p. 286[3]; Tomes, P. Z. S. 1861, p. 281[4],
Sciuropterus volucella, Allen, Mon. N.-Amer. Rodent. p. 655[5].
Quimichpatlan seu *Mus volans,* Hernandez, De Quad. Nov. Hisp. fol. 9, cap. xxvi.

Hab. North America, from Labrador[5] ?—Mexico (*Hernandez*); Guatemala (*Salvin*[4]).

The difference of opinion as to the specific identity of the North-American Flying-Squirrels has been already discussed. If the southern form is regarded as distinct, it may be considered to range from about 49° North latitude through the United States southwards to Mexico and Guatemala. In the former of these last countries it was long ago described by Hernandez; in the latter it was discovered by Mr. Salvin[4].

The habits of this species have been well described by various American naturalists, most fully, perhaps, by Audubon and Bachman, from their own observations and from those of Dr. Smith of Baltimore. It is a crepuscular and gregarious animal; and of a summer evening scores may be seen at a time, climbing nimbly to the summit of a tree, and then sailing down to the foot of another, apparently in sport. They do not build nests in the branches like the true Squirrels, the young, three to six in number, being born in a hollow tree.

2. SCIURUS.

Sciurus, Linnæus, Syst. Nat. i. p. 86 (1766).

The very natural and almost cosmopolitan genus of true Squirrels is characterized by a slender form, well suited for arboreal habits, by a long and often bushy tail, and by the absence of internal cheek-pouches and of a flying-expansion of the skin. It is hardly less distinguished by the extreme variability in coloration which is found among its members, and it has consequently proved a perfect mine of wealth to the species-makers.

More than twenty years ago Professor Baird demonstrated the polymorphism of some of the North-American Squirrels*; but it is only lately that similar critical attention has been given to those of the Neotropical Region. Of these *fifty-nine* nominal species have been described, no fewer than *nineteen* having been added to the list in 1867 by the late Dr. Gray†. In 1877 Mr. J. A. Allen cleared away much of this confusion‡, and greatly reduced the number of valid species. Not having access, however, to the European museums, he was misled in some cases by the often totally inadequate or

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Sciurus hypochondriis prolixis volitans of the 'Fauna Suecica.' As these animals were found to be both members of the Linnæan genus *Sciurus*, the name *volans* was very properly restricted by Pallas and Gmelin to the Palæarctic species, which now stands as *Sciuropterus volans* (Linnæus).

* Mamm. N. Amer. pp. 244, 245.

† Ann. & Mag. Nat. Hist. 3rd ser. xx. pp. 415–434.

‡ Mon. N.-Amer. Rodent. pp. 666–779.

even erroneous descriptions of some previous writers; and after an examination of the types of no less than forty-nine nominal species, I was enabled in 1878 to throw some further light on the subject*, as well as to confirm several of Mr. Allen's identifications; and most of my rectifications have since been frankly accepted by that gentleman†. I was then only able to recognize twelve valid species of Neotropical Squirrels, of which nine have been received from Central America, three appearing to be peculiar to our subregion. This proportion shows that in the New World *Sciurus* is an essentially Nearctic type. Arrived in the tropics, it has developed an endless series of varieties and a considerable number of species; but very few new forms are found when we penetrate further into the South-American continent.

The following are the best characters which I can find for the nine Central-American Squirrels which appear to be specifically separable:—

1. *S. carolinensis.* Average length of head and body 10″; of tail-vertebræ about 8″. Upper parts grey or brownish grey, the middle of the back brownish, a rufous lateral stripe usually present; lower parts white. Tail moderate, washed with white, the hairs yellowish brown or whitish, with narrow black rings, broader black subterminal bands, and white tips.
2. *S. arizonensis.* Average length about 12″·50, of tail about 11″. Upper parts grey, more or less mixed with yellowish brown, especially along the middle of the back; lower parts pure white. Tail long, very bushy, strongly washed with white, the hairs tawny or fulvous, each with two narrow and one broader black band and a long white tip.
3. *S. griseoflavus.* Average length (in skin) about 13″·50, of tail 10″·25. Upper parts nearly uniform yellowish grey, the narrow black rings and minute whitish tips of the hairs merely obscuring the general tint produced by their broad pale-brown median bands. Lower parts yellowish red, the hairs in one specimen obscurely ringed with black. Tail bushy, strongly washed with white; the hairs yellowish or pale brown, each with two or three narrow and one broader black band succeeded by a long white tip.
4. *S. variegatus.* Average length about 10″·50, of tail 8″·75. Pelage somewhat soft, with a good deal of under-fur. Upper parts grey or reddish grey, the hairs black, tipped or ringed and tipped with white or red. Lower parts deep red, orange, or white. Tail black, washed with white, the hairs usually rufous at their bases, with black rings and white tips.
5. *S. hypopyrrhus.* Average length about 11″·75, of tail 10″. Pelage close-lying and rather glossy, with little under-fur. Upper parts dark brown or black, often broadly ringed with rufous or white. Lower parts varying from deep

* "On the Squirrels of the Neotropical Region," P. Z. S. 1878, pp. 656–670; Supplementary Note, tom. cit. p. 954.

† Bull. U. S. Geol. Surv. iv. pp. 877–887.

red to creamy white, sometimes ringed with black. Tail black, generally washed with white, the hairs rufous, pale brown or whitish at their bases, each with one or two black or brown rings and a white tip.

6. *S. variabilis.* Average length about 12″, of tail 11″. Pelage rather harsh and sparse, ears high and narrow. Upper parts red, either pure or more or less grizzled with black. Lower parts white, fulvous, or light rufous, sharply defined from the dorsal colouring. Tail black, washed with bright orange-red, often very bushy.
7. *S. æstuans.* Average length about 8″·25, of tail 7″·50. One upper premolar. Upper parts dull olive, the hairs dusky, minutely ringed with rufous or fulvous. Lower parts rufous, fulvous, greyish, or white. Tail black, more or less washed with rufous or fulvous; the hairs brown, banded with black, and more or less broadly tipped with red or yellow.
8. *S. deppei.* Average length nearly 9″, of tail 7″·25. Two upper premolars. Upper parts dark olive, often darker along the middle of the back. Lower parts white, greyish white, or light fulvous. Tail black, lightly washed with white; the hairs fulvous, with black bands and short pure white tips.
9. *S. chrysurus.* Average length about 5″·50, of tail 3″·75. Two upper premolars. Upper parts dark olive, the hairs very minutely tipped with fulvous. Breast bright rufous, rest of lower parts like the upper, but paler. Tail nearly uniform with the back; the hairs reddish fulvous, barred with black and minutely tipped with pale yellow or white.

Two or three of the other North-American Squirrels approach our regional boundary, if they do not actually cross it. Mr. Allen says that the western *ludovicianus* race of the Fox-Squirrel, *S. niger*, Linnæus, "doubtless ranges far into Mexico"*; but he adduces no evidence in support of his belief. *S. fossor*, Peale, and *S. aberti*, Woodhouse, are species of limited range, inhabiting California and Arizona; but as yet there is no record of their having been obtained in Mexico.

1. Sciurus carolinensis.

Sciurus carolinensis, Gmelin, Linn. Syst. Nat. i. p. 148 (1788, ex Pennant)[1]; Baird, Mamm. N. Am. p. 256[2]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 35[3]; de Saussure, Rev. et Mag. Zool. 1861, p. 4[4]; Tomes, P. Z. S. 1861, p. 281[5]; Alston, P. Z. S. 1878, p. 658[6].

Sciurus carolinensis, var. *yucatanensis*, Allen, Mon. N.-Am. Rodent. p. 705[7]; Bull. U.S. Geol. Surv. iv. p. 879[8].

Ardilla of Spanish Americans (common to all the other species).

Hab. North America, from New Brunswick southwards[7].—Mexico (*de Saussure*[4]),

* Mon. N.-Am. Rodent. p. 723. *Cf. infrà*, p. 126.

Nuevo Leon (*Couch*, *U.S. Nat. Mus.*[3]), Yucatan (*Gaumer*, *Mus. Boucard*), Merida (*Schott*, *U.S. Nat. Mus.*[7]); Guatemala, Volcan de Fuego &c. (*Salvin*[5]).

Concerning this well-known Nearctic form I can add hardly anything to Mr. Allen's exhaustive account[7]. He distinguishes three geographical races or varieties, of which two, his "var. *carolinensis*" and "var. *yucatanensis*," are found within the Neotropical limits. The former, smaller and browner than the northern *leucotis* race, is apparently the *S. carolinensis* which M. de Saussure records from Mexico[4], and Mr. Tomes from Guatemala[5]; and there are specimens from Nuevo Leon in the National Museum at Washington. Mr. Allen's "var. *yucatanensis*" is based on specimens collected at Merida, which agree in their pale coloration, the absence of rufous on their flanks, their small size, and the comparative coarseness of their pelage. He considers that this form is "possibly specifically distinct," but remarks that the Nuevo-Leon examples are fairly intermediate; and, judging from some specimens kindly submitted to me by M. Boucard, I think he was wise in refusing it specific rank, at least for the present.

Of the geographical variations presented by the Grey Squirrel throughout its very extensive range, Mr. Allen observes they consist "mainly in decrease in size southward, and an increase in intensity of coloration, the whitish tips of the hairs of the dorsal surface seen in northern specimens being replaced by yellowish brown in the southern ones, except in the case of var. *yucatanensis*."

The habits of the Grey Squirrel, as observed in Carolina, have been well described by Audubon and Bachman*. It is possessed of great agility, but is far from being timid, easily allowing a near approach. Although sometimes found in dry forests, it appears to prefer the neighbourhood of streams or of swamps, breeding either in hollow trees or in large nests composed of leaves and of Spanish moss (*Tillandsia*), and bringing forth two broods of five or six young ones in the course of the summer.

In Guatemala Messrs. Godman and Salvin found this Squirrel to be very common in the forests of evergreen oaks (*Quercus*) which grow on the volcanoes and elsewhere at an elevation of between 5000 and 7000 feet.

2. Sciurus arizonensis.

Sciurus arizonensis, Coues, Amer. Nat. i. p. 357 (1867, descr. orig.)[1]; Alston, P. Z. S. 1878, p. 659[2]; Allen, Bull. U.S. Geol. Surv. p. 880[3].

Sciurus colliæi, Allen, Mon. N.-Am. Rodent. p. 738 (nec Richardson)[4].

Hab. North America, Arizona[1].—Mexico, Mazatlan (*Bischoff*, *U.S. Nat. Mus.*[4]), Tampico (*de Montluc*, *Mus. Paris*).

This handsome species was first described by Dr. Elliott Coues, who discovered it near

* Quad. N. Amer. i. pp. 55–63, pl. vii.

Fort Whipple, in Arizona [1]. It is closely allied to the last species, from which, however, both Dr. Coues and Mr. Allen consider it to be "thoroughly distinct." The superior size, the coloration of the long heavy tail, and the absence of any lateral line appear to be constant; but in some specimens in the British and Paris Museums the grey of the upper flanks is not so clear from rufous as in the examples examined by Mr. Allen [4]. The specimen described by that gentleman as having "the lower surface considerably varied with irregular patches and streaks of pale yellowish rufous" gives support to the idea that further material will enable us to unite the next species with the present. In that case the name *S. arizonensis* will stand, Dr. Coues's description having priority over Gray's.

In the "Monographs of the North-American Rodentia" Mr. Allen was unfortunately misled, by imperfect descriptions and a bad figure, into identifying the Arizona Squirrel with Richardson's *Sciurus colliæi* [4]. His kindness in lending me one of the typical specimens of *S. arizonensis* enabled me to point out this error [2], which he has promptly rectified in his "Synonymic List of the American *Sciuri*" [3].

3. **Sciurus griseoflavus.**

Macroxus griseoflavus, Gray, Ann. & Mag. Nat. Hist. 3rd ser. xx. p. 427 (1867, descr. orig.) [1].
Sciurus griseoflavus, Alston, P. Z. S. 1878, p. 660 [2]; Allen, Bull. U.S. Geol. Surv. iv. p. 880 [3].
? *Sciurus ludovicianus*, Tomes, P. Z. S. 1861, p. 281 (nec Custis) [4].

Hab. Mexico (*Liebmann, Mus. Hafn.*); Guatemala, Dueñas (*Salvin* [4]), Volcan de Fuego (*Godman & Salvin, Mus. Brit.*), Coban (*Boucard, Mus. Paris*).

I have pointed out elsewhere [2] that the types of Gray's *Macroxus griseoflavus* are quite distinct from those of his *M. leucops* (with which Mr. Allen had confused them in his Monograph), and appear to me to be either very nearly allied to the last species, if not identical with it. They differ from typical specimens of *S. arizonensis* in colour, the upper parts being yellowish grey and the lower parts yellowish red. But, as above mentioned, some specimens of the northern form seem to show a tendency to vary in this respect; and, judging from the analogy of other species, it seems highly probable that the two races will be found to intergrade. Mr. Allen observes that, in view of my diagnosis of *S. griseoflavus*, his inclination is to unite it with *S. arizonensis*, but that he refrains from doing so at present [3]; and till further material is forthcoming this appears to be the only proper course.

I have not been able to discover in the British Museum the Guatemalan specimens which Mr. Tomes referred to *S. ludovicianus* [4]; but it appears probable that they belonged to the present species, which has a general resemblance in colour to some of the numerous varieties of the Fox Squirrel. In this I am confirmed by Mr. Salvin, who tells me that he believes that Mr. Tomes applied the name to specimens of this Squirrel obtained by him in the oak-forests of the Volcan de Fuego, where he found it

in abundance in company with *Sciurus carolinensis*. Its range probably extends some distance further northwards; for a Mexican Squirrel in the Copenhagen Museum, labelled "*S. affinis*, an sp. n. ?, Reinhardt," did not appear to me to be separable.

4. **Sciurus variegatus.** (Tab. XI.)

Sciurus variegatus, Erxleben, Syst. Reg. An. p. 421 (1777, ex Hernandez)[1]; de Saussure, Rev. et Mag. de Zool. 1861, p. 4[2]; Alston, P. Z. S. 1878, p. 660[3].

Sciurus aureogaster, F. Cuvier, Hist. des Mamm. iii. livr. lix. (1829, descr. orig.)[4]; Is. Geoffroy, Zool. Voy. 'Vénus,' p. 156, Atlas pls. x., xi.[5]; Baird, Mamm. N. Am. p. 282[6]; Allen, Mon. N.-Am. Rodent. p. 750[7]; Bull. U.S. Geol. Surv. iv. p. 882[8].

Sciurus leucogaster, F. Cuvier, Suppl. de Buffon, Mamm. i. p. 300 (1831, descr. orig.)[9].

Sciurus albipes, Wagner, Abh. bayer. Ak. ii. p. 101 (1837, descr. orig.)[10].

Sciurus ferruginiventris, Audubon & Bachman, Pr. Ac. Philad. 1841, p. 101 (descr. orig.)[11]; Quad. N. Am. i. p. 292, pl. xxxviii.[12]; Baird, Mamm. N. Am. p. 281[13].

Sciurus varius, Wagner, Suppl. Schreb. Säugth. iii. p. 168 (1843, descr. orig.)[14]; Dugès, La Nat. i. p. 138[15].

Sciurus socialis, Wagner, Suppl. Schreb. Säugth. iii. p. 170 (1843, descr. orig.)[16].

Macroxus morio, Gray, Ann. & Mag. Nat. Hist. 3rd ser. xx. p. 424 (1867, descr. orig.; nec Wagner)[17].

Macroxus maurus, Gray, tom. cit. p. 425 (descr. orig.)[18].

Macroxus leucops, Gray, tom. cit. p. 427 (descr. orig.)[19].

Sciurus leucops, Allen, Mon. N.-Am. Rodent. p. 753[20].

Coztio cotequallin, Hernandez, De Quad. Nov. Hisp. fol. 8, cap. xxvi.

Hab. California, Monterey (*Mus. Paris*[5]).—Mexico, Tehuantepec, Orizaba, Cordova (*Sumichrast, U.S. Nat. Mus.*[7]), Oaxaca (*Sallé, Mus. Brit.*), Mirador (*Liebmann, Mus. Hafn.*), Santuario, Jalapa (*Deppe, Mus. Berol.*), La Parada (*Sallé, Mus. Paris*), Durango (*Xanthus, U.S. Nat. Mus.*[20]); Guatemala (*Boucard, Mus. Berol.*; *Patten, U.S. Nat. Mus.*[20]).

Writing in 1878 I felt myself obliged to bring together, under this name, two Mexican Squirrels of which typical specimens are very different in appearance[3]. Mr. Allen had kept them separate under the names of *S. aureigaster*[7] and *S. leucops*[20], remarking that the difference in coloration left little doubt of their distinctness, but adding that "more abundant material may show that they are specifically separable"*. The colour-variation I found not to be nearly so great as it is in the next species; and after a careful examination of a great number of specimens, especially of the fine series in the Paris Museum, I was unable to find a single distinctive character which is constant. Typical specimens of the two forms may be thus described:—

1. The *aureogaster* type. Upper parts dark grey, the hairs black, finely tipped with white. Lower parts deep red, which is usually more or less washed over the grey on the shoulders and flanks.
2. The *leucops* type. Upper parts lighter grey, with a peculiar golden lustre, the

* Op. cit. p. 755.

hairs being finely ringed with bright rufous and tipped with white; nape and rump more strongly rufous. Lower parts bright red, orange, or white.

Many specimens, however, which have the general appearance of *aureogaster* show the rufous subterminal ring of *leucops* on some part of the dorsal surface; and in others we find the red nape and rump-patches gradually appearing. I am therefore compelled to return to the view long ago expressed by Isidore Geoffroy[5], and to regard them as varieties of the same species.

With regard to distribution, most of the examples which I have seen with authenticated localities are from Mexico; but Mr. Allen mentions one from Guatemala in the Washington Museum, and there is one from the same country at Berlin. Specimens in the British Museum are labelled as being from Colombia; but there can be little doubt that this is an error. *S. aureogaster* is stated by Prof. Sumichrast (as quoted by Mr. Allen) to be "the common species of *Sciurus* of the tierra caliente of the east coast" of Mexico; and both forms are found in the States of Oaxaca and Tehuantepec.

In his latest revision of the American Squirrels, Mr. Allen has accepted the above identifications, and only differs from me as to the proper name of the species. This he still holds to be Frédéric Cuvier's barbarous title of *aureogaster* (or, as Mr. Allen prefers to write it, *aureigaster*), rejecting Erxleben's name of *variegatus* as being insufficiently defined and "admittedly composite"[8]. In this I must venture still to differ from my much-esteemed fellow-worker. *S. variegatus* was founded primarily on the *Coztiocotequallin* * of Hernandez, Buffon's *Coquallin* being merely quoted as a synonym; and Erxleben's diagnosis and description appear to me to be quite characteristic of the *leucops* form of the present species †. That some subsequent compilers should have confused *S. variegatus* with *S. niger* seems to me to be no good reason for abandoning the name in favour of such a thoroughly objectionable title as *S. aureogaster*.

5. **Sciurus hypopyrrhus.** (Tab. XII.)

Sciurus hypopyrrhus, Wagler, Isis, 1831, p. 610 (descr. orig.)[1]; de Saussure, Rev. et Mag. Zool. 1861, p. 5[2]; Allen, Mon. N.-Am. Rodent. p. 746[3]; Bull. U.S. Geol. Surv. iv. p. 881[4]; Alston, P. Z. S. 1878, p. 662[5].

Sciurus nigrescens, Bennett, P. Z. S. 1833, p. 41 (descr. orig.)[6].

Sciurus colliæi, Richardson, Zool. Voy. 'Blossom,' p. 8, pl. i. (1839, descr. orig.)[7].

Sciurus variegatoides, Ogilby, P. Z. S. 1839, p. 117 (descr. orig.)[8].

Sciurus richardsoni, Gray, Ann. Nat. Hist. x. p. 265 (descr. orig., nec Bachman)[9].

Sciurus boothiæ, Gray, List Mamm. Brit. Mus. p. 139 (1843, sine descr.)[10]; Allen, Mon. N.-Am. Rodent. p. 741[11].

Sciurus griseocaudatus, Gray, Zool. Voy. 'Sulphur,' p. 34, pl. viii. (1844, descr. orig.)[12].

* Several other Squirrels are mentioned by Hernandez; but it is impossible to identify them satisfactorily.

† "*S.* corpore supra nigro, albo et fusco variegato. . . . . Magnitudo dupla *S. vulgaris*. Auriculæ imberbes. Corpus supra nigro, albo et fusco variegatum, ventre flavescente. Cauda supra corpus reflexa"[1].

Sciurus fuscovariegatus, Schinz, Synop. Mamm. ii. p. 15 (1845, ex Gray)[13].
Macroxus adolphei, Lesson, Descr. des Mamm. &c. p. 141 (1847, descr. orig.)[14].
Macroxus pyladei, Lesson, tom. cit. p. 142 (1847, descr. orig.)[15].
Sciurus dorsalis, Gray, P. Z. S. 1848, p. 138, pl. vii. (descr. orig.)[16]; Sclater, op. cit. 1870, p. 670[17].
Sciurus rigidus, Peters, Monatsb. Ak. Berl. 1863, p. 652 (descr. orig.)[18]; Frantzius, Arch. f. Nat. xxxv. 1, p. 266[19]; Fischer, Zool. Gart. 1877, p. 21[20].
Sciurus oculatus, Peters, Monatsb. Ak. Berl. 1863, p. 653 (descr. orig.)[21].
Sciurus intermedius, Verreaux (ap. Gray), Ann. & Mag. Nat. Hist. 3rd ser. xx. p. 421 (1867, descr. orig.)[22].
Macroxus nicoyana, Gray, tom. cit. p. 423 (1867, descr. orig.)[23].
Macroxus melania, Gray, tom. cit. p. 425 (1867, descr. orig.)[24].

Hab. Mexico (*Uhde, Mus. Berol.*[21]), Amoca (*Mus. Brit.*), Goazacoalcos (*Sumichrast, U.S. Nat. Mus.*[3]); Guatemala (*Verreaux, Mus. Brit.*[22]); Honduras (*Dyson, Mus. Brit.*[9]); Nicaragua (*Mus. Paris.*[14]); Costa Rica (*Zeledon, Carmiol, U.S. Nat. Mus.*[11]), Nicoya (*Salvin, Mus. Brit.*[23]), San José (*Frantzius & Hoffmann, Mus. Berol.*[18 19]); Panama, Veragua (*Arcé, Mus. Brit., Mus. Paris.*), Point Burica (*Kellett & Wood, Mus. Brit.*[24]; *Boucard, Mus. Paris.*), Obispo (*Hassler Exp., Mus. Coll. Harv.*[3]).

The numerous nominal species whose names are given above were arranged in Mr. Allen's Monograph as synonyms of two species, *S. hypopyrrhus*[3] and *S. boothiæ*[11]. An examination of the series in the various European Museums, including most of the types, enabled me to show that they thoroughly intergrade[5], a conclusion which has since been accepted by Mr. Allen[4]. I have even grave doubts as to whether they are really separable from the last species. But as I have not yet found specimens strictly intermediate between *S. variegatus* and *S. hypopyrrhus* in the character of the pelage and the annulation of the fur, it seems best to keep them distinct.

In this species the differences in comparative length of tail and ears, on which Mr. Allen laid most weight in separating *S. boothiæ* from *S. hypopyrrhus*, cannot be depended on; and I have been totally unable to detect any constant difference in general stoutness of form or breadth of muzzle. As to colour, the intergradations of the different varieties are quite complete; so that it is often difficult or impossible to say to which a given specimen is to be referred. Each variety, however, has its own type, and seems to predominate in its own immediate locality. The five principal phases known to me may be thus arranged:—

1. The *hypopyrrhus* type. Upper parts dark grey, the hairs black, ringed with white or pale fulvous. Lower parts either concolorous with the upper, or washed with rufous. To this variety I agree with Mr. Allen in referring Bennett's *S. nigrescens*[6]; and it is to the same form that the description of *Macroxus boothiæ* in Gray's memoir of 1867 refers, although that author's *Sciurus boothiæ* of 1843[10] was founded on a young example of

the white-bellied *colliæi* phase. The rufous-bellied specimens lead us directly into

2. The *rigidus* type. Upper parts usually marbled with fulvous and black, the hairs being glossy brown or black with a median band of yellowish brown. Lower parts bright rufous (*rigidus* [18]), or varied with rufous and white, either symmetrically (*intermedius* [22]) or asymmetrically (*nicoyanus* [23]). In many specimens, as observed by Mr. Allen, there is a more or less marked tendency to the development of a pale grizzled lateral stripe placed high on the flanks and confining the dark dorsal area to a broad median band. From these we have every gradation into the rufous phase of
3. The *dorsalis* type. Upper parts with the median dorsal area black, flanks and lower parts white, fulvous, or rufous. In many individuals the hairs of the black dorsal area will be found to have concealed rings of white or fulvous; so that we have a further transition into
4. The *colliæi* type. Upper parts much as in the *rigidus* form, but usually less rufous; lower parts white (*colliæi* [7], *adolphei* [14]) or pale fulvous (*variegatoides* [8], *griseocaudatus* [12], *pyladei* [15], *oculatus* [21]). Usually the dark coloration of the back is extended over the shoulders, hips, and limbs; but in others it is confined to the middle of the back, as in the last phase, while the rufous-bellied phases lead us directly back into the *rigidus* form.
5. The *melanius* type. Upper and lower parts uniform glossy dark brown, often with irregular patches of paler brown. This is a very peculiar phase, and I have not yet seen any direct intergradation with the other varieties; but uniformity of coloration is so abnormal among the Squirrels that it seems impossible to doubt that Mr. Allen is right in regarding it as a melanism. The colour is exactly similar to that of the back of the white-bellied *dorsalis* varieties, in which also the paler apparently faded patches are sometimes seen. It appears to be much rarer than any of the other forms described.

With regard to the synonymy, I may observe that I have been able to examine the types of all the "species" here united, excepting that of *S. hypopyrrhus*, which, however, has been well described by Wagler and Wagner; it appears to be a dark variety without the usual wash of white on the tail. That of *S. nigrescens* only differs in having the fur of the lower parts ringed like that of the back; it agrees well with specimens in the Paris and Berlin Museums. *S. colliæi* and *S. adolphei* are synonyms for the white-bellied form above described, from which I am also unable to distinguish *S. richardsoni* of Gray (not of Bachman), on which both *S. boothiæ* and *S. fuscovariegatus* were founded. *S. variegatoides*, *S. griseocaudatus*, *S. pyladei*, and *S. oculatus* are all intermediate links with more or less fulvous lower parts, leading to the phase with a red or red-and-white belly, on which the names *S. intermedius*, *S. rigidus*, and *Macroxus nicoyanus* have been bestowed.

Of the geographical distribution of the various races we can only judge from the comparatively few specimens of which the exact localities have been noted. The *hypopyrrhus* phase appears to be the most northern, the *colliæi* to prevail principally along the Pacific slopes, and the *dorsalis* to be the most southern. Each, however, appears to be found along with others in some part. Thus, I have seen specimens of the *hypopyrrhus* type from Mexico, Honduras, and Guatemala, of *rigidus* from Guatemala, Nicaragua, and Costa Rica, of *dorsalis* from Nicaragua, Costa Rica, and Panama, and of *colliæi* from the west coast of Mexico and Guatemala, Nicaragua, and Costa Rica. The only localities which I know for the *melanius* phase are Nicaragua and Panama.

Herr J. von Fischer has described the habits of a pair of this species in captivity, under the name of *S. rigidus*. He found them to be strictly diurnal animals, and to be fond of lying stretched on a branch in the full sunshine. On the ground their movements were much like those of the common European Squirrel, but they were always most unwilling to leave the branches. They frequently assumed a peculiar position when feeding; holding on to a branch by their hind feet, they would hang head downwards and devour the food which they held between their fore paws [20]. Several examples of the *dorsalis* and *colliæi* varieties have been exhibited of late years at the Zoological Society's Gardens, under the name of *Sciurus dorsalis*.

Our Plate is drawn from the typical specimens of the *melanius* form in the British Museum.

6. **Sciurus variabilis.**

Sciurus variabilis, Is. Geoffroy, Mag. de Zool. 1832, pl. iv. (descr. orig.)[1]; Allen, Mon. N.-Am. Rodent. p. 768[2]; Bull. U.S. Geol. Surv. iv. p. 884[3]; Alston, P. Z. S. 1878, p. 665[4].

Sciurus gerrardi, Gray, P. Z. S. 1861, p. 92, pl. xvi. (descr. orig.)[5]; Allen, Mon. N.-Am. Rodent. p. 766[6].

Hab. Panama, Obispo (*Hassler Exp.*, *Mus. Coll. Harv.*[6]), Caimito (*Boucard*, *Mus. Paris.*), Darien (*Maack*, *Mus. Coll. Harv.*[6]).—South America, to Bolivia and Peru[4].

In the paper quoted above[4] I endeavoured to show that the Squirrels generally known by the various names of *S. variabilis*, *S. langsdorffi*, *S. tricolor*, *S. gerrardi*, and some others are merely phases of one widely distributed and extremely variable species. Mr. Allen, in his Monograph, had arrived at much the same conclusion, but kept the last-named distinct on account of its smaller size and shorter ears; but on examination of a sufficient series, I was unable to find any constancy in the proportions of the ears, while the difference in size totally disappeared, as shown by the following series of measurements:—9·50, 9·75, 10·00, 10·25, 10·75, 11, 11·50, 11·75, 12·00, 12·75, 13″·00. The smaller specimens (*S. variabilis*, *S. gerrardi*, &c.) appear to prevail towards the north: but this is not constant; for a Santa-Martha example measures over 12 inches,

while others from Brazil are under 10 inches, although evidently adult. Nor is it constantly connected with any of the numerous varieties of coloration—rufous, grizzled, and melanistic specimens occurring of all sizes. In this case, also, Mr. Allen has fully accepted my determination [3].

S. variabilis appears merely to enter the most southern portion of our subregion; the Museum of Comparative Zoology at Cambridge, Massachusetts, has received specimens from Panama collected by Dr. Maack and by the Hassler Expedition [6]; and there are others, obtained in the same State by M. Boucard, in the Paris Museum. I have been unable to trace it further north.

7. **Sciurus æstuans.** (*Sciurus griseogenys*, Tab. XIII.)

Sciurus æstuans, Linnæus, Syst. Nat. i. p. 88 (1766, descr. orig.)[1].

Sciurus æstuans, var. *hoffmanni*, Peters, Monatsb. Ak. Berl. 1863, p. 654 (descr. orig.)[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 267 [3].

Sciurus æstuans, var. *rufo-niger*, Allen, Mon. N.-Am. Rodent. p. 757 (nec *S. rufo-niger*, Pucheran)[4].

Sciurus hoffmanni, Allen, Bull. U.S. Geol. Surv. iv. p. 885 (1878, ex Peters)[5].

Macroxus xanthotus, Gray, Ann. & Mag. Nat. Hist. 3rd ser. xx. p. 429 (1867, descr. orig.)[6].

Macroxus griseogena, Gray, loc. cit. (1867, descr. orig.)[7].

Sciurus griseogenys, Alston, P. Z. S. 1878, p. 667 [8].

Hab. Nicaragua (*Mus. Berol.*); Costa Rica (*Hoffmann, Mus. Berol.*[2]; *Frantzius* [3]); Volcan de Cartago (*Arcé, Mus. Brit.*); Panama, Calevevora (*Arcé, Mus. Brit.*; *Boucard, Mus. Paris.*).—South America to Brazil and Bolivia.

There are two marked geographical races of this well-known Neotropical species, and some confusion has arisen as to their relationship and nomenclature. The northern form, ranging from Nicaragua to Ecuador, is distinguished by its large size and its bright red belly and tail, and was first described as a variety by Professor Peters [2]. It subsequently became the ground of several of Gray's nominal species, and was then identified by Mr. Allen with the *Sciurus rufo-niger* of Pucheran [4]. In my review of the Neotropical Squirrels I was enabled to show that this was an error; and although expressing my belief that the races would yet be found to intergrade, I felt compelled in the absence of intermediate specimens to separate the northern variety provisionally under Gray's name of *S. griseogenys* [8]. Mr. Allen followed the example, but preferred to raise Dr. Peters's varietal title of *hoffmanni* to specific value [5]. Since then, however, my friend Mr. Oldfield Thomas has described complete connecting links, which he finds in specimens from Ecuador, exactly the locality from which they might be expected, as it is there that the Andean and Amazonian races meet *. Mr. Allen and I are there-

* P. Z. S. 1880, pt. ii. (in the press).

fore now at one in regarding the northern form as the *hoffmanni* variety of *S. æstuans*; but unfortunately there has not been time to correct the lettering of our Plate, which represents the types of Gray's *Macroxus griseogena* and *M. xanthotus*.

In Costa Rica, according to Dr. v. Frantzius, this species is found along with *S. rigidus* [=*S. hypopyrrhus*] both in the warm lands of the coast and on the highest mountains. "In the cacao plantations, as in the Matina valley, they are so numerous, and destroy the ripe cacao-fruit (*Mazorcas*) in such quantities, that the principal duty of the overseer is to walk daily through the plantation and to shoot the Squirrels. Nevertheless a great number of cacao-beans are bitten and rendered unfit for sale; these are called 'Cacao ardillado' (from *ardilla*, a Squirrel), and are given in payment to the workmen."

8. **Sciurus deppei.**

Sciurus deppei, Peters, Monatsb. Ak. Berl. 1863, p. 654 (descr. orig.)[1]; Alston, P. Z. S. 1878, p. 668[2]; Allen, Bull. U.S. Geol. Surv. iv. p. 885[3].
Macroxus tephrogaster, Gray, Ann. & Mag. Nat. Hist. 3rd ser. xx. p. 431 (1867, descr. orig.)[4].
Sciurus tephrogaster, Allen, Mon. N.-Am. Rodent. p. 763[5].
Macroxus tæniurus, Gray, Ann. & Mag. Nat. Hist. 3rd ser. xx. p. 431 (1867, descr. orig.)[6].
Macroxus medellinensis, Gray, op. cit. 4th ser. xx. p. 408 (1877, descr. orig.)[7].

Hab. Mexico (*Sallé, Mus. Brit.*), Papantla (*Deppe, Mus. Berol.*[1]), Cordova, Orizaba (*Sumichrast, U.S. Nat. Mus.*[5]); British Honduras, Belize (*Blancaneaux, Mus. Brit.*); Guatemala (*Salvin, Mus. Brit.*[4 6]; *Hague, U.S. Nat. Mus.*[5]); Honduras (*Dyson, Warwick, Mus. Brit.*[4]).—South America, Colombia[7].

Mr. Allen was led to admit the validity of Gray's *M. tephrogaster*, on finding that it differed from the last two species in having normally two well-developed upper premolars[5]; and the specimens which I have been able to examine confirm his observation. He failed, however, to recognize this Squirrel in Professor Peters's description of his *S. deppei*, which he doubtfully referred to the southern form of *S. carolinensis*. An examination of the types of *S. deppei*, *M. tephrogaster*, *M. tæniurus*, and *M. medellinensis* convinced me that they are all strictly synonymous, the species presenting but little variation in coloration. In *S. deppei* and *M. tæniurus* the lower parts are washed with fulvous; in *M. tephrogaster* they are greyish white; while the types of *M. medellinensis* are smaller and have the middle of the back nearly black, exactly as in many specimens of *S. æstuans*. Intermediate examples occur; and the whole range of variation between the extremes is comparatively trifling[2].

In Guatemala, so far as Mr. Salvin knows, this species is confined in its range to the forests of the Pacific side of the Cordillera. Here it is not uncommon up to an elevation of about 3000 feet.

9. Sciurus chrysurus.

Sciurus rufoniger, Pucheran, Rev. Zoolog. 1845, p. 336 (descr. orig., nec Gray)[1]; Alston, P. Z. S. 1878, p. 669[2]; Allen, Bull. U.S. Geol. Surv. iv. p. 886[3].
Sciurus chrysuros, Pucheran, Rev. Zool. 1845, p. 337 (descr. orig.)[4].

Hab. Panama, Veragua (*Arcé, Mus. Brit.*[2], *Mus. Coll. Harv.*).—South America, Colombia[14].

On examining the type of Pucheran's *Sciurus rufoniger* in the Paris Museum, I found that it was not a variety of *S. æstuans*, as Mr. Allen had supposed in his Monograph, but rather allied to *S. deppei*; and I soon recognized in it a small Squirrel of which I had seen several specimens from Panama, and which I had begun to fear would require a new name. These examples prove to agree further with *S. deppei* in having two upper premolars, but differ in being more than one third smaller, in the colour of the lower parts (which are only paler than the upper, save on the breast), and in the tail being nearly uniform in colour with the back (the hairs having only very minute white or yellow tips)[2]. On receiving a specimen of this Squirrel from me, Mr. Allen at once recognized its claim to specific distinction[3]; but he has since called my attention to the fact that the name of *rufoniger* was preoccupied, having been applied to an Asiatic Squirrel by Gray three years before the date of Pucheran's description *. But the specimen to which Pucheran gave the name of *S. chrysuros* is clearly identical with his *S. rufoniger*, differing only in having a somewhat more rufous tail[2], and this title can therefore be used for the species.

[TAMIAS.]

Several species of Chipmunks or Ground-Squirrels are widely distributed throughout North America. According to Mr. Allen, both the *dorsalis* variety of *Tamias asiaticus* (Gmelin) and *T. harrisi* (Audubon and Bachman) are found in New Mexico; and he believes that the range of the latter species "probably extends in the interior far southwards into Western Mexico" †. There appears, however, to be no direct evidence that this is the case.

3. SPERMOPHILUS.

Spermophilus, Fréd. Cuvier, Mém. du Mus. ix. p. 293 (1822).
Citillus, Lichtenstein, Darst. neu. Säugeth. pl. xxxi. (1827–34).

The Spermophiles, Sousliks, or Squirrel-Marmots are distinguished from their near allies, the true Marmots and the Prairie-dogs, by their slender form and by the possession

* *Sciurus rufonigra*, Gray, Ann. & Mag. Nat. Hist. x. p. 263 (1842, descr. orig.)=*S. rufoniger*, Gray, List Mamm. Brit. Mus. p. 142 (1843). Dr. Anderson regards this as one of the numerous local races of *S. prevosti*, Desm. (Zool. Researches, i. p. 272).

† Mon. N.-Am. Rodent. p. 812.

of large internal cheek-pouches, as well as by the first digit of the fore foot being rudimentary or absent, and by cranial and dental characters. The genus is one highly characteristic of the Palæarctic and Nearctic Regions, but four species are found within our limits. These may be characterized as follows:—

1. *S. annulatus.* Length about 9″·50, of tail-vertebræ 6″·50. Ears large. Upper parts varied with tawny and black, shoulders and fore limbs bright rufous; lower parts fulvous. Tail long, narrow, its upper surface with broad *transverse* black stripes.
2. *S. grammurus.* Average length 12″; tail-vertebræ 8″. Ears large. Upper parts mottled tawny and black; lower parts pale fulvous. Tail bushy, more than two-thirds the length of the head and body, its lower surface with three black lateral lines.
3. *S. spilosomus.* Average length 7″, of tail-vertebræ 3″. Ears almost obsolete. Upper parts reddish brown, with subquadrate whitish spots, which are *not* arranged in rows; lower parts yellowish white. Tail narrow, half as long as the head and body, its lower surface with one lateral black band.
4. *S. mexicanus.* Average length 8″, of tail-vertebræ 4″. Ears small but distinct. Upper parts reddish brown, with subquadrate white spots arranged in longitudinal rows; lower parts whitish. Tail fuller than in last species.

1. Spermophilus annulatus.

? *Sciurus lewisi,* Hamilton-Smith, Griffith's Cuvier's An. Kingd. iii. p. 190, pl. (1827)[1].
Spermophilus annulatus, Audubon & Bachman, J. Ac. Philad. viii. p. 319 (1842, descr. orig.)[2]; Quad. N. Am. ii. p. 213, pl. lxxix.[3]; Allen, Mon. N.-Am. Rodent. p. 886[4].

Hab. Mexico, plains of Colima (*Xantus, U.S. Nat. Mus.*[4]).

As Mr. Allen has pointed out, this is *probably* the *Sciurus lewisi* of Hamilton-Smith[1]; but I agree with him in considering its identity to be too doubtful to allow of the name being used. The first trustworthy description of the species is that of Audubon and Bachman[2], founded on a specimen of uncertain origin, but believed to be "from the western prairies." No further examples were known for many years; and Professor Baird suggested that the type (which appears to have been lost) might have been an example of a West-African Squirrel, *Sciurus rufo-branchiatus,* Waterhouse *—an identification which was afterwards positively made by the late Mr. Andrew Murray †. But Mr. Allen has described a specimen in the National Museum at Washington, obtained by Xantus near Colima in South-western Mexico, which proves that the animal is a true Spermophile, though very Sciurine in general appearance. The skull is unfortu-

* Mamm. N. Am. p. 327. † Geogr. Distr. Mamm. p. 359.

nately wanting; but the characters of the skin seem to indicate near affinity to the next species, from which, as well as from all other known American Sciuridæ, it is at once distinguished by the conspicuous *transverse* barring of its long narrow tail.

Nothing is yet known of its distribution or habits.

2. Spermophilus grammurus.

Sciurus grammurus, Say, Long's Exp. ii. p. 72 (1823, descr. orig., fide Baird)[1].

Spermophilus grammurus, Baird, Mamm. N. Am. p. 310, pl. iv.[2]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 38[3]; de Saussure, Rev. et Mag. Zool. 1860, p. 56[4]; Allen, Mon. N.-Am. Rodent. p. 826[5].

Spermophilus macrurus, Bennett, P. Z. S. 1833, p. 41 (descr. orig.)[6]; Dugès, La Nat. i. p. 137[7].

Spermophilus couchii, Baird, Proc. Ac. Philad. 1855, p. 332 (descr. orig.)[8]; Mamm. N. Am. p. 311, pl. lxxxi.[9]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 38[10].

Ardilla of Mexicans[8] (common to the Squirrels).

Hab. North America, western regions, from Oregon southwards[5].—Mexico (*Deppe, Mus. Berol.*), Tamaulipas, Nuevo Leon (*Couch, U.S. Nat. Mus.*[8]), Victoria (*Berlandier, ibid.*[5]), Guanajuato, Guadalajara (*Dugès*[7]).

The Lined-tailed Spermophile differs from all its congeners, except the next, in its Squirrel-like appearance, which it owes to its large pointed ears and long bushy tail; in Mexico it consequently shares the Spanish name of *Ardilla*. In coloration it is very variable, and three tolerably well-marked races have been described as distinct species under the names of *S. grammurus* (Say), *S. beecheyi* (Richardson), and *S. douglassi* (Rich.). Mr. Allen, however, has shown that they cannot be satisfactorily separated:—"between *beecheyi* and *douglassi* the intergradation is most thorough, while *beecheyi* passes gradually into *grammurus*"[5]. Bennett's *S. macrurus*[6], from Western Mexico, is referred by Mr. Allen to his "var. *beecheyi*;" but on an examination of the type in the British Museum I find that it is a somewhat dark example of the typical form of *S. grammurus*, with which phase *S. couchii*, Baird, appears also to be identical.

The range of the species seems to extend throughout Western North America, from Washington Territory to the Mexican States of Jalisco and Guanajuato, where it was recorded by Dr. Dugès[7]. It is very abundant in California; and an interesting account of its habits, as observed there, is given by Dr. Elliott Coues in the first volume of the 'American Naturalist' (p. 359), under the name of *S. beecheyi*. He states that it forms large colonies, and that its general manners are much like those of the Prairie-dog. "The burrows usually occur in clusters, and under little mounds or hillocks of dirt formed by the soil heaped up during their excavation; but single ones are scattered in every direction. Upon these earthworks the animals may be seen at all times, sitting upright and motionless as statues, their fore paws drooped and their eyes intently fixed on the passer-by; or, when no suspicious object appears, lying and basking in the sun, or playing merrily with each other on the ramparts of their citadels."

3. Spermophilus spilosomus.

Spermophilus spilosoma, Bennett, P. Z. S. 1833, p. 40 (descr. orig.)[1]; Baird, Mamm. N. Am. p. 321[2]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 39[3]; Allen, Mon. N.-Am. Rodent. p. 864[4].

Hab. North America, New Mexico and Texas[4].—Mexico, Chihuahua city (*Potts, U.S. Nat. Mus.*[3]), Janos (*Kennerly, ibid.*[3]).

This appears to be a species of very limited range, and it is extremely rare in collections. Originally described from a Californian specimen[1], it has been obtained at only a few places in New Mexico, Texas, Chihuahua, and Sonora; and the United-States National Museum, so rich in large series of native animals, could only boast of six specimens when Mr. Allen published his monograph. Dr. Kennerly, however, says that in Sonora "this species was quite common on the prairies around Janos. It lived sometimes among the rocks, but more often had its bed in piles of dirt heaped around the base of some bush. These piles were elevated several feet above the surrounding ground, and were entered by three, four, or more apertures near the summit. The animals were exceedingly shy, and a specimen was procured with difficulty"[3].

4. Spermophilus mexicanus.

Sciurus mexicanus, Erxleben, Syst. Reg. An. p. 428 (1777, part.)[1].
Citilus mexicanus, Lichtenstein, Darst. neu. Säugeth. pl. xxxi. (1827–34, descr. orig.)[2].
Spermophilus mexicanus, Baird, Mamm. N. Am. p. 319[3]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 39[4]; Dugès, La Nat. i. p. 138[5]; Allen, Mon. N.-Am. Rodent. p. 868[6].
Tlalmototli, Hernandez, De Quadr. Nov. Hisp. fol. 9, cap. xxvi.
Urion[2], *Huron*[6], of Mexicans.

Hab. North America, Texas[6].—Mexico (*Verreaux, Mus. Brit.*), Toluca (*Deppe, Mus. Berol.*[2]), Pesqueria Grande, Matamoras (*Couch, Berlandier, U.S. Nat. Mus.*[4]), Guadalajara, Guanajuato (*Dugès*[5]), Tlalpam (*Geddes, Mus. Brit.*).

Erxleben's *Sciurus mexicanus*, being primarily founded on the *Tlalmototli* of Hernandez, must have been partially intended to represent this species; but the description has evidently been confused with that of some other animal, probably of a *Tamias*. No recognizable description can be found prior to that of Lichtenstein, which was founded on a specimen obtained by Deppe in Central Mexico. The species appears to be very characteristic of the tableland of that country, ranging from Texas to the southern and western States of the Mexican Republic.

Of the habits of the Mexican Spermophile the following brief account is given by Mr. Clark, of the United-States Boundary Survey:—"This species was found in greatest numbers in the valley of the lower Rio Grande. It lives in the ground; and its burrow is always made with reference to the protection afforded by a thorny bush or cactus

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against the attacks of the Coyote and other enemies. If the entrance happens to be in an exposed place, it is sometimes fortified with thorny pieces of the mesquite and cacti. Though somewhat companionable, each, as a rule, seems to have its own house. Like other mammals, it is most above ground in the morning and evening in search of food; yet it is the least affected by the heat of the midday sun. It is omnivorous. Its bed is a globular mass, lined with soft material, and has but one entrance"[4].

4. CYNOMYS.

Cynomys, Rafinesque, Amer. Monthly Mag. ii. p. 45 (1817, fide Baird, Mamm. N. Am. p. 329).
Anisonyx, Rafinesque, loc. cit.

The well-known "Prairie-Dogs" or Prairie-Marmots of North America are very closely allied to the Spermophiles, but are of more thickset form, and have well-developed claws on all their toes. Their cheek-pouches are shallow; their grinding-teeth are placed obliquely, so that they converge strongly behind; and their skulls present slight but constant differences.

Only two species are known, *Cynomys ludovicianus* and the western *C. columbianus*. The former, which is the only species hitherto recorded from Mexico, may be readily distinguished by its size, its reddish-brown colour, and its comparatively long tail, which is brownish-black towards the tip, instead of whitish, as in *C. columbianus*. It averages about 12 inches in length of head and body; and the tail-vertebræ measure about $3\frac{1}{2}$ inches.

1. Cynomys ludovicianus.

Arctomys ludovicianus, Ord, Guthrie's Geogr., 2nd Amer. ed., pp. 292, 302 (1817, descr. orig., fide Baird, Mamm. N. Am. p. 331)[1].
Cynomys ludovicianus, Baird, Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 39[2]; Dugès, La Nat. i. p. 137[3]; Allen, Mon. N.-Am. Rodent. p. 892[4].
Perrito, Perrito del campo, of Mexicans[2 3].

Hab. North America, east of the Rocky Mountains, from lat. 49° southwards[4].—Mexico, Chihuahua (*Kennerly*[2], *Dugès*[3]).

The range of the Missouri Prairie-Marmot extends to the Mexican State of Chihuahua, where its occurrence has been recorded by the naturalists of the United-States Boundary Survey and by Dr. Dugès[3]. Dr. Kennerly says that to the west of the Rio Grande it was observed as far as the Sierra Madre[2].

Much has been written on the habits of the Prairie-Dog, of its "towns" or "villages," and of its strange fellow citizens, the Prairie-Owl (*Speotyto cunicularia*) and the Rattle-Snake (*Crotalophorus confluentus*), with which it is popularly but erroneously believed

to live in perfect harmony in the same burrow. Full references to the literature of this subject will be found in Mr. Allen's monograph[4].

Fam. II. CASTORIDÆ.

1. CASTOR.

Castor, Linnæus, Syst. Nat. i. p. 78 (1766).

The remarkable family of Castoridæ contains only a single genus, which until lately has been generally considered to consist of two distinct though closely allied species, respectively characteristic of the Palæarctic and Nearctic Regions. First systematically separated by Kuhl*, the specific distinction of the American Beaver was insisted on by the two Cuviers†; and the question was more fully worked out by the late Professor J. F. Brandt‡. The last-named careful zoologist disposed satisfactorily of most of the external characters which had been supposed to exist; but a comparison of eight European and five American skulls led him to support the specific distinction of *Castor canadensis*, as indicated by several cranial peculiarities, notably by the proportional narrowness of the facial region and comparative shortness of the nasal bones.

In 1867 the question was reconsidered by Dr. W. W. Ely, of Rochester, New York§, who was enabled, by the examination of a very large series of American Beaver skulls, to show that a great amount of variety existed in the very points on which most trust had been reposed. Mr. Allen has since confirmed Dr. Ely's observations‖, which render it clear that although the characters of the breadth of the facial region and the length of the nasals are generally available, they are by no means constant. The number of Beavers' skulls to which I have access is not sufficient to enable me to add to the facts adduced by the American writers; but from the whole evidence it appears clear that the Beavers of the New and Old Worlds are not fully differentiated, and must be regarded as geographical races of a single circumpolar species.

1. Castor fiber.

Castor fiber, Linnæus, Syst. Nat. i. p. 78 (1766, descr. orig.)[1]; Allen, Mon. N.-Am. Rodent. p. 433[2].

Castor canadensis, Kuhl, Beitr. z. Zool. p. 64 (1820, descr. orig.)[3]; Baird, Mamm. N. Am. p. 355[4]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 40[5].

* Beitr. z. Zool. p. 64.

† Mammif. iii. pl. 274 (51e livr.); Ossem. Foss. (3e éd.) v. p. 57.

‡ Mém. Ac. Pétersb. 6e sér. vii. pp. 43–76, pls. i.–iii.

§ Morgan's 'American Beaver and his Works' (Philadelphia, 1868), Appendix A, pp. 287–306.

‖ Mon. N.-Am. Rodent. pp. 437–445.

Hab. Palæarctic Region, North America, from Alaska and Canada southwards[2].—Mexico (*Berlandier*[2]), Sierra Madre (*U.S. Bound. Surv.*[5]), Matamoras (*Berlandier*, *U.S. Nat. Mus.*[5]).

The naturalists of the United-States Survey met with the Beaver on the Mexican boundary, it being especially plentiful in the valley of the Gila river; the most elevated point at which they found its traces was in the Colorado Cañon, in the Sierra Madre, about 5000 feet above the sea-level[5]. Mr. Allen observes that he has not been able to ascertain its exact limit south of the Rio Grande, but that it is well ascertained that its range extends for some distance into Mexico; and he adds that the manuscripts of the late Dr. Berlandier attest its existence in various parts of that Republic[2]. The only preserved Mexican specimens of which I have been able to learn are two skulls obtained by the last-named naturalist at Matamoras, and now in the United-States national collection at Washington[25].

Fam. III. MURIDÆ.

1. MUS.

Mus, Linnæus, Syst. Nat. i. p. 79 (1766), as restricted by Waterhouse, Zool. Voy. 'Beagle,' i. p. 75.

As already remarked, the Muridæ of Central America are almost exclusively Nearctic in their affinities. The first genus however, that of restricted *Mus*, throws no light on geographical distribution; for none of its members are indigenous to the New World, although four house-haunting species have been unwittingly introduced from Europe. The true Rats and Mice differ from all the native American forms in the structure of their molars, in which each transverse ridge, in an unworn state, is composed of three tubercles, instead of showing two only, as in *Hesperomys* and its allies. The species established in our subregion may be recognized by the following characters:—

1. *M. rattus*. Tail longer than the head and body, ears half as long as the head; upper parts greyish black, lower parts hardly paler. Length of head and body about 7″, of tail 7″·50.
2. *M. alexandrinus*. Tail and ears as in last species; upper parts dark grey, lower parts and feet yellowish white. Head and body about 7″, tail 8″.
3. *M. decumanus*. Tail shorter than head and body, ears one third the length of the head; upper parts greyish brown, lower parts greyish white, feet dusky. Head and body 9″, tail 7″·50.
4. *M. musculus*. Tail about as long as head and body, ears half the length of the head; upper parts brownish grey, lower parts slightly paler. Head and body about 3″·50, tail 3″·50.

1. **Mus rattus.**

Mus rattus, Linnæus, Syst. Nat. i. p. 83 (1766, descr. orig.)[1]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 270[2]; Dugès, La Nat. i. p. 138[3].

Hab. Cosmopolitan.—Mexico (*Deppe, Mus. Berol.*), Guanajuato (*Dugès*[3]); Costa Rica (*Frantzius*[2]).

The Black Rat has been recorded from Mexico, whence a specimen was sent by Deppe to the Berlin Museum, and where it was found by Dr. Dugès in the State of Guanajuato[3], and from Costa Rica, where Dr. v. Frantzius says it is the only true Rat known. Not exposed to the competition of the next species, and finding suitable shelter in the numerous rents and fissures which earthquakes cause in the clay walls of the houses, the Black Rat has become extremely plentiful in most parts of the latter country, although it is said to have been first introduced by Spanish ships so recently as the beginning of the present century[2].

2. **Mus alexandrinus.**

Mus alexandrinus, Ét. Geoffroy, Descr. de l'Égypt, Hist. Nat. ii. p. 733, Atlas, pl. v. fig. 1 (1812, descr. orig.)[1].

Mus tectorum, Savi, Nuov. Giorn. de' Lett., P^te^ Scient. x. p. 73 (1825, descr. orig.)[2]; Baird, Mamm. N. Am. p. 441[3]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 42[4].

Hab. Cosmopolitan.—Mexico, Matamoras (*Berlandier, U.S. Nat. Mus.*[4]), Nuevo Leon (*Couch, ib.*[4]), Oaxaca (*Sallé, Mus. Brit.*).

This species is very closely allied to the last, with which it is said to interbreed and to produce fertile young*. It appears to remain constant in coloration in all climates; and as it especially affects ships, it has become very widely spread over the world. It is probably not common, however, in Central America; for the only specimens that I know of are the Mexican ones recorded above.

3. **Mus decumanus.**

Mus decumanus, Pallas, Nov. Sp. Glir. p. 91 (1778, descr. orig.)[1]; Dugès, La Nat. i. p. 138[2].

Hab. Cosmopolitan.—Mexico, Guanajuato, Guadalajara (*Dugès*[2]).

In Costa Rica, as already noticed, the Brown Rat is still unknown; and this is the more remarkable, as Dr. v. Frantzius remarks, because it commonly infests the English and German ships which visit the port of Puntarenas.

In Mexico Dr. Dugès observed it in the States of Guanajuato and Guadalajara[2]; but I have never myself seen a specimen from any part of Central America.

* A. de l'Isle, Ann. des Scient. Nat. 1865, pp. 173–222. *Cf.* Martins, Zool. Gart. 1867, pp. 178–184, 216–221; Troschel, Arch. f. Naturg. xxxii. 1, p. 170; Giebel, Zeitschr. gesammt. Naturw. 1879, pp. 619–622, pl. ix.

4. **Mus musculus.**

Mus musculus, Linnæus, Syst. Nat. i. p. 83 (1766, descr. orig.)[1]; Tomes, P. Z. S. 1861, p. 281[2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 271[3]; Dugès, La Nat. i. p. 138[4].

Hab. Cosmopolitan.—Mexico (*Sallé, Mus. Brit.*), Guanajuato, Guadalajara (*Dugès*[4]); Guatemala, Dueñas (*Salvin, Mus. Brit.*[2]); Costa Rica (*Frantzius*[3]).

As in every other part of the world settled by Europeans, the House-Mouse appears to be abundant throughout Central America. Mr. Tomes observed of two specimens sent by Mr. Salvin from Guatemala that they were smaller than European examples, and that he had noticed the same difference in others sent by Fraser from Colombia[2].

Dr. v. Frantzius remarks that in Costa Rica Mice may be seen running about the floors of the best houses in broad daylight, and that, as they do little damage compared with Rats, no trouble is taken to extirpate them[3].

2. HESPEROMYS.

Hesperomys, Waterhouse, Zool. Voy. 'Beagle,' i. p. 75 (1839).

The greater number of the Muridæ of the New World are referable to Mr. Waterhouse's genus *Hesperomys*, as restricted by Professor Spencer F. Baird * and Dr. Elliott Coues †. The members of this extensive genus all agree in having a typically murine skull, and in their dentition—the incisors not being grooved, the first having three roots, and the second and third diminishing in size successively. They differ, however, among themselves in many other important characters, and form a number of separate groups, some of which might well be regarded as of generic value, were it not for the intergrading forms which connect one with another and prevent their being sharply defined. Nevertheless they may be conveniently retained as subgenera, the recognition and definition of the numerous species being thereby rendered more easy. Of these subgenera Dr. Coues recognized six North-American forms, to which I think at least two more (*Nyctomys* and *Tylomys*) must be added, making eight in all. Of these, four are represented in Central America by about twelve species. These may be thus characterized:—

A. Vesperomys, Coues, Proc. Ac. Philad. 1874, p. 178. Form mouse-like; ears large, scantily haired; tail moderate or long, closely haired; small internal cheek-pouches usually (or always?) present. Skull with no marked supra-orbital process.

1. *H. teguina*‡. Above warm dark reddish-brown, passing into deep fawn below. Length of head and body 3″·25, of tail about 2″.

* Mamm. N. Am. p. 458.

† Proc. Ac. Philad. 1874, p. 178; Mon. N.-Am. Rodent. p. 43.

‡ This species is only provisionally placed here. *Cf. infrà*, p. 144.

2. *H. leucopus.* Above varying from fawn shaded with black to lead-grey; lower parts and feet pure white. Average length 3″·25, of tail 2″·80.
3. *H. aureolus.* Above reddish fawn, passing below into pale fawn or yellowish white. Average length 3″, of tail 3″·60.
4. *H. californicus.* Ears and tail very long. Above brownish grey, slightly washed with fulvous on the flanks; beneath greyish white. Average length about 5″, of tail 4″·90, of ear 0″·70 to 1″.
5. *H. aztecus.* Above rich rufous, shaded with black along the back; lower parts and feet almost pure white; tail nearly naked. Average length 3″·35, of tail 4″·08.
6. *H. mexicanus.* Above dark grey, more fulvous on flanks, with a silvery lustre; lower parts white or greyish white, sometimes washed with fawn. Average length about 4″·20, of tail 3″·20.
7. *H. melanophrys.* Above lustrous grey (as in the last species); lower parts white, "edges of the eyelids and a small anteocular spot jet-black." Average length 4″, of tail 4″·80.

B. Nyctomys, de Saussure, Rev. et Mag. de Zool. 1861, p. 106 (=*Myoxomys*, Tomes, P. Z. S. 1861, p. 284). Form Dormouse-like. Ears large; feet very short and broad; tail long, fully haired and pencilled. Skull short and broad, with well-developed supraorbital ridges.

8. *H. sumichrasti.* Above bright rufous, beneath pure white, a black line or spot in front of the eye; tail blackish. Average length 5″·10, tail 5″·50.

C. Oryzomys, Baird, Mamm. N. Amer. p. 458 (1857). Form Rat-like. Ears small, hairy; hind feet large, with naked soles; tail moderate, either scantily haired or almost naked. Skull with marked supraorbital crests.

9. *H. palustris.* Above greyish brown, passing into dirty white beneath; tail scantily haired above, more fully below; fur coarse and glossy. Average length 4″·50, of tail 4″·50.
10. *H. couesi.* Above clear reddish brown, passing into dirty white or light fawn below; tail almost naked; fur close and woolly. Length about 5″, of tail 5″·70.

D. Tylomys, Peters, Monatsb. Ak. Berl. 1866, p. 404 (=*Neomys*, Gray, Ann. & Mag. Nat. Hist. 4th ser. xii. p. 416, 1873). Ears rather large, naked; soles naked. Skull with no raised supraorbital ridges, but with a broad horizontal edge over orbits; anteorbital foramen not visible from above.

11. *H. nudicaudus.* Above yellowish brown, mixed with black, beneath ochreous-yellow; chin, breast, and median line of belly white; tail blackish at base, the terminal half white. Length about 7″·85, of tail 8″·30.
12. *H. panamensis.* Above mouse-grey, beneath white; tail blackish at base, the terminal third white. Length about 8″·50, of tail 8″.

Dr. v. Frantzius has stated that Professor Peters has recorded the occurrence in Guatemala of *Hesperomys albigularis*, Tomes (giving a reference to the 'Monatsbericht,' 1860, p. 105*); but Dr. Peters assures me that this is a complete mistake, and that he never received that species from Central America.

1. **Hesperomys teguina.** (Tab. XIV. fig. 1.)

Mus teguina, Gray, P. Z. S. 1843, p. 79 (sine descr.)[1].
Hesperomys teguina, Alston, P. Z. S. 1876, p. 755 (descr. orig.)[2]; op. cit. 1877, p. 446.

Hab. GUATEMALA, Coban (*Mus. Brit.*[1]).

This very peculiar-looking species was named without description by Gray in 1843[1], and first characterized by me in 1876[2]. As yet it is only known from the mounted type in the British Museum, purchased along with a number of other Guatemalan animals from Leadbeater; and I only provisionally refer it to the subgenus *Vesperomys* until its whole organization is known. In the comparative shortness of its tail and in its nearly uniform rich coloration it is strikingly different from all the Nearctic Mice, and also from all the Neotropical forms with which I am acquainted.

2. **Hesperomys leucopus.**

Mus leucopus, Rafinesque, Am. Monthly Mag. iii. p. 446 (1818, descr. orig., fide Baird)[1].
Hesperomys texanus, Woodhouse, Proc. Ac. Philad. vi. p. 242 (1853, descr. orig.)[2]; Baird, Mamm. N. Am. p. 464[3]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 43[4].
Hesperomys sonoriensis, Le Conte, Proc. Ac. Philad. vi. p. 413 (1853, descr. orig.)[5]; Baird, Mamm. N. Am. p. 474[6]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 43[7].
Hesperomys (*Vesperomys*) *leucopus sonoriensis*, Coues, Proc. Ac. Philad. 1874, p. 179[8].
Hesperomys leucopus sonoriensis, Coues, Mon. N.-Am. Rodent. p. 79[9].
Hesperomys americanus, Coues, Amer. Nat. xiii. p. 231 (1879, ex Kerr †)[10].

Hab. NORTH AMERICA, from the Arctic Regions southwards[9].—MEXICO (*Deppe, Mus. Berol.*), Charco Escondido (*Couch, U.S. Nat. Mus.*[4]), Sonora (*Clark, ib.*[4]), Oaxaca (*Sallé, Mus. Brit.*).

The variety or geographical race of the Common White-footed Mouse, which inhabits the interior of North America west of the Mississippi, was first described as a distinct species by Le Conte[5] from a North-Mexican specimen. The "variety" is

* Arch. f. Naturg. xxxv. 1, p. 271.

† Founded on Kerr's *Mus agrarius americanus* (An. Kingd. 1792, p. 231), which is described as a variety of the European *M. agrarius*. Not being used binomially, the term has no claims on adoption; but even if it had been otherwise, it cannot be received, as Kerr had already described a *M. americanus* (tom. cit. p. 227) based on Pennant's "American Rat" of the Leverian Museum (Hist. Quad. p. 441; Arct. Zool. i. p. 130)—an animal which is probably undeterminable, unless it may have been founded on American examples of *M. rattus*.

defined by Dr. Coues as having usually a proportionally shorter tail and a less rufescent coloration than the typical *H. leucopus* of the Eastern States; but the comparison of an immense series of specimens in the United-States Museum has enabled him to show that these characters are very far from being constant, and that they cannot be regarded as marking even a pure geographical race; "for undoubtedly *leucopus* occurs throughout the United-States range of '*sononiensis*,' and everywhere the intergradation is perfect"[9].

The exact southern range of the White-footed Mouse remains to be traced; but it certainly extends far into Mexico. Sallé's collections in the British Museum include an example of the *sonoriensis* variety, labelled "South Mexico;" and another of the true *leucopus* phase is from Oaxaca. In the warmer lowland regions of the republic, however, it is probably replaced by the next species, *H. aztecus*.

Of the habits of the White-footed Mouse in Northern Mexico Mr. J. A. Clark observes that "This animal seems to live, as circumstances may determine, either on the ground or in the hollows of trees. . . . . This or an allied species builds globular nests of fine grass, lined with feathers and other soft material, on the opuntia and other chapparel. They are quite numerous in some sections, and, seen at a distance hanging on thorny branches, resemble old bird-nests. The entrance, usually at the side or bottom, is to all appearance so entirely closed as to suggest the question, By what built, or for what purpose, is such a contrivance? I never saw one in an unfinished state, nor the animal at work; labour is perhaps performed after nightfall"[7].

3. **Hesperomys aztecus.**

Hesperomys aztecus, de Saussure, Rev. et Mag. Zool. 1860, p. 105, pl. ix. fig. 4 (descr. orig.)[1].
Hesperomys (*Vesperomys*) *aztecus*, Coues, Proc. Ac. Philad. 1874, p. 180[2]; Mon. N.-Am. Rodent. p. 100[3].

Hab. North America, California[3].—Mexico (*de Saussure*[1], *U.S. Nat. Mus.*[3]).

The specific distinction of the Aztec Mouse of M. de Saussure has been lately confirmed by Dr. Coues, the Smithsonian Institution having received spirit specimens collected at Cape St. Lucas, California. Besides the rich rusty red of the flanks of the adult (for the young appear to be grey like those of *H. leucopus*), the species may be recognized by the extension of the darker colouring to the basal third of the metatarsus and by the long, nearly naked, and almost unicolorous tail. Dr. Coues observes that "there is no reasonable doubt that the animal is a subtropical offset of *H. leucopus*, modified just as *Neotoma ferruginea* has been [from *N. fuscipes*]; but, at the same time, the differentiation has proceeded so far that we are bound to place the animal on specific footing, at any rate until intermediate specimens are forthcoming"[3]. Till then, also, we can say nothing as to the distribution of the species in Central America, the only known Mexican specimens being without exact localities.

4. Hesperomys aureolus.

Mus (*Calomys*) *aureolus*, Audubon & Bachman, Journ. Ac. Philad. vi. p. 302 (1842, descr. orig.)[1].
Hesperomys (*Vesperomys*) *aureolus*, Coues, Proc. Ac. Philad. 1874, p. 180[2]; Mon. N.-Am. Rodent. p. 91[3].
Hesperomys nuttalli, Baird, Mamm. N. Am. p. 467 (nec Harlan?*)[4].
? *Hesperomys fulvescens*, de Saussure, Rev. et Mag. Zool. 1860, p. 102 (descr. orig.)[5].

Hab. North America, from South Carolina southwards[3].—Mexico (*de Saussure*[5]; *Sallé, Mus. Brit.*).

I have very little hesitation in identifying M. de Saussure's *Hesperomys fulvescens* with the Golden Mouse of the Southern United States. In his original description it is remarked that "pour la couleur elle se rapproche beaucoup de l'*H. nuttalli*, Harl., mais elle a la queue plus longue, ses oreilles ne sont pas ferrugineuses et la couleur du poil paraît être un peu plus foncée"[5]. In the British Museum there are two Mexican Mice, collected by Sallé, which agree very well with M. de Saussure's description, but are larger, and have the tail, though still long, proportionally shorter, while their ears are concolorous with the back, exactly as in *H. aureolus*. Dr. Coues's table of measurements of a series of the latter species shows a considerable variability in proportions, though the average length of tail is decidedly shorter than in the Mexican examples under consideration[3]. Nevertheless, when we consider the intermediate specimens and remember the immense extent to which other American Mice have been shown to vary in this respect, we must hesitate to found specific distinction on such a character, and better characters must, I think, be pointed out before *H. fulvescens* can be recognized as more than a long-tailed race of *H. aureolus*.

5. Hesperomys californicus.

Mus californicus, Gambel, Proc. Ac. Philad. 1848, p. 78 (descr. orig.)[1].
Hesperomys (*Vesperomys*) *californicus*, Coues, Proc. Ac. Philad. 1874, p. 180[2]; Mon. N.-Am. Rodent. p. 98[3].

Hab. North America, California[1 3].—Mexico, Tehuantepec (*Boucard, Mus. Brit.*).

As Dr. Coues remarks, this large long-eared Mouse has much the appearance of a half-grown *Neotoma*. First discovered by Gambel at Monterey, its range seems to extend southwards to Tehuantepec; for a specimen obtained by the British Museum from that locality, through M. Boucard, only differs from Californian examples in the same collection in being rather paler and more ashy in colour. All these specimens appear to be larger than those examined by Dr. Coues, giving an average length

* Although Harlan's description of his *Arvicola nuttalli* (Am. Monthly Journ. 1832, p. 446) agrees with this species, it is also applicable to a rufous specimen of *H. leucopus*; I have therefore followed Mr. Allen (Bull. Mus. Comp. Zool. ii. p. 180) and Dr. Coues in retaining Audubon and Bachman's name.

(in skin) of 5″·35, and of tail 5″·24, against his respective measurements of 4″·65 and 4″·55. In some the tail is much more fully haired than in others.

6. Hesperomys mexicanus.

Hesperomys mexicanus, de Saussure, Rev. et Mag. de Zool. 1860, p. 103, pl. xi. figs. 1, 1*a* (descr. orig.)[1].

Hab. Mexico (*de Saussure*[1]).

I know nothing of this species save M. de Saussure's original description and Dr. Coues's critical remarks, which will be treated of under the next species.

Nothing has been recorded of its habits; nor does M. de Saussure mention the localities from which his specimens were obtained.

7. Hesperomys melanophrys.

Hesperomys (*Vesperomys*) *melanophrys*, Coues, Proc. Ac. Philad. 1874, p. 181 (descr. orig.)[1]; Mon. N.-Am. Rodent. p. 102[2].

Hab. Mexico, Tehuacan, Tehuantepec (*Sumichrast*, *U.S. Nat. Mus.*[1 2]).

It is not without much doubt that I keep this species even provisionally distinct from the last.

The three specimens on which Dr. Coues founded his species presented marked discrepancies from the original description of *H. mexicanus*, having the tail considerably longer than the head and body, the lower parts pure white, and the eye surrounded by a conspicuous black ring[1 2]. But Dr. Coues has described three other examples, obtained for the Smithsonian Institution by the same collector in the same part of Mexico, which he himself regards as throwing great doubt on the distinction of the two species. Considerably smaller than either M. de Saussure's or Dr. Coues's types, these individuals want the black eye-ring, two of them have the tail shorter than the head and body, and one has the lower parts slightly tinged with fulvous. "Much more material than that now in our possession," says Dr. Coues, "will be required to determine the limits of variation of this large grey *leucopus*-like Mouse of Mexico and to fix the species on secure basis"[2]. It appears to me that we have probably here to do with one large southern species of the subgenus *Vesperomys*, characterized by its grey fur having a peculiar hoary lustre, caused by the pale extreme tips of the hairs, and varying in proportional length of tail and in the presence or absence of a black ring round the eye. But, as I have not myself had an opportunity of comparing specimens, I refrain from definitely uniting them.

8. **Hesperomys sumichrasti.** (Tab. XIV. fig. 2.)

Hesperomys [*Nyctomys*] *sumichrasti*, de Saussure, Rev. et Mag. Zool. 1860, p. 107, pl. ix. figs. 2, 3 (descr. orig.)[1].

Hesperomys (*Myoxomys*) *salvinii*, Tomes, P. Z. S. 1861, p. 285, pl. xxxi. (descr. orig.)[2].

Hab. Mexico, east of Cordilleras (*de Saussure*[1]; *Sallé*, *Mus. Brit.*); British Honduras, Belize (*Blancaneaux*, *Mus. Brit.*); Guatemala, Dueñas (*Salvin*, *Mus. Brit.*[2]).

Although I have not had an opportunity of examining the types of M. de Saussure's *H. sumichrasti*, I have no doubt that he and Mr. Tomes had the same animal before them, and that each separately described the same species. The only point of difference in their descriptions is as to size, the former giving the length of the head and body in his two specimens as 100 millims. and 88 millims. respectively (=3″·95 and 3″·50), while that of Mr. Tomes's type was 5″·50. But one at least of the Swiss zoologist's examples was immature, as shown by the colour; and Mr. Tomes's was an unusually large individual; for in a number of spirit specimens the length varies from 4·90 to 5·30 inches, while one example from British Honduras agrees almost exactly with the measurements of M. de Saussure's larger specimen. In every other particular—in the hairy almost bushy tail terminating in a pencil of hairs, in the short broad hind feet with proportionally long second and fifth toes, in the nearly uniform light rufous of the upper parts, and in the peculiar character of the lower fur being pure white to the roots—the nominal species agree with one another, and differ so much from all the other known forms of *Hesperomys* that each of their describers has proposed a new subgenus for his discovery. In point of fact *Nyctomys* is one of the best-marked of all the subgenera of *Hesperomys*.

In Guatemala Messrs. Salvin and Godman tell me that *H. sumichrasti* is very common in the neighbourhood of Dueñas, where the Indians will procure almost any number of specimens for a trifle. Most of theirs were obtained in this way; but they sometimes found it themselves in the hedgerows which surround the coffee-plantations of the neighbourhood; and on one occasion Mr. Salvin poked one out of a nest with a stick, when the Mouse dropped into the sleeve of his coat, to the astonishment of both performers.

The figure in the Plate is taken from one of the Dueñas specimens.

9. **Hesperomys palustris.**

Mus palustris, Harlan, Am. Journ. Science, xxxi. p. 386 (1837, descr. orig.)[1].

Hesperomys (*Oryzomys*) *palustris*, Baird, Mamm. N. Am. p. 482[2]; Coues, Proc. Ac. Philad. 1874, p. 184[3]; Mon. N.-Am. Rodent. p. 113[4].

Hab. North America, from New Jersey southwards[4].—Mexico (*Sallé*, *Mus. Brit.*), Tehuantepec (*Sumichrast*, *Postell*, *U.S. Nat. Mus.*[4]).

The Common Rice-Mouse of the Southern United States is the type of Baird's sub-

genus *Oryzomys*, and, as might be expected from its structural characters, is aquatic in its habits, specially frequenting the dykes and dams of irrigated rice-fields, and swimming and diving with facility. For its addition to the Central-American fauna we are indebted to Dr. Coues, who observes that he cannot distinguish a Tehuantepec specimen from the ordinary *H. palustris* of the United States. "In colour it is a little clearer than most Carolina skins, yet not of the paler yellowish-brown noticed in Kansas ones, but rather a brighter fulvous-brown; the underparts are unusually pure white"[4]. Two Mexican examples in the British Museum have rather more naked tails than United-States specimens; but in other respects they do not show any approach to the next species.

In the same monograph Dr. Coues doubtfully referred specimens of an *Oryzomys* from Jamaica to the present species. He has since informed me that it proves to be distinct; but, as far as I am aware, he has not yet named or described it.

10. **Hesperomys couesi.** (Tab. XV. fig. 1.)

Hesperomys couesi, Alston, P. Z. S. 1876, p. 756 (descr. orig.)[1].

Hab. Mexico (*Geale*; *Verreaux*, *Mus. Brit.*[1]); Guatemala, Coban, Choctum (*Salvin & Godman*, *Mus. Brit.*[1]; *Mus. Berol.*); Honduras (*Mus. Brit.*).

I have ventured to dedicate this handsome species to my friend Dr. Elliott Coues, whose recent labours have done so much to clear up the confusion into which the North-American Muridæ had fallen.

Coues's Rice-Mouse is certainly referable to the subgenus *Oryzomys*, being closely allied to the last species; it differs strikingly, however, in its long and almost entirely naked tail (the fine sparse hairs of which are hardly perceptible), its close, fine, and somewhat woolly fur, and its clear reddish-brown coloration, which varies in different specimens from dark red-brown to light rufous; it also appears to be a decidedly larger animal. From the character of the tail and fur it may be expected to prove less strictly aquatic in its habits than *H. palustris*.

There are several specimens of Coues's Rice-Mouse in the British and Berlin Museums, from Mexico, Guatemala, and Honduras; but I have not yet been able to trace its range beyond these States.

The figure is taken from one of the typical Mexican specimens in the British Museum.

11. **Hesperomys nudicaudus.**

Hesperomys (*Tylomys*) *nudicaudus*, Peters, Monatsb. Ak. Berlin, 1866, p. 404, figs. 1–4, skull (descr. orig.)[1].

Hab. Guatemala (*Mus. Basel.*[1]).

Professor Peters's type is an adult female from Guatemala, which was submitted to

him for determination by Herr Schneider, of the Natural-History Museum at Basel. In addition to its almost hairless particoloured tail and naked soles, it is remarkable in the development of the upper edges of the orbits, which are spread into a sort of horizontal shelf, instead of rising into perpendicular supraorbital ridges as in *Oryzomys*. Dr. Peters therefore regards it as the type of a separate subgenus, *Tylomys*; and it will be seen that the next species presents the same characters.

12. **Hesperomys panamensis.** (Tab. XV. fig. 2.)

Neomys panamensis, J. E. Gray, Ann. & Mag. Nat. Hist. 4th ser. xii. p. 417, fig. 1, skull (1873, descr. orig.)[1].

Hab. Panama (*Boucard, Mus. Brit.*[1]).—South America, Colombia.

This handsome species was described by the late Dr. Gray from a specimen which was obtained by the British Museum from Panama, through M. Boucard. Struck by the peculiarities of its skull, Gray made it the type of a new genus, *Neomys*; but in these, as well as in general external characters, it agrees closely with the last species, and is consequently referable to Professor Peters's subgenus *Tylomys*, of which *Neomys* must be regarded as a synonym. It differs very markedly, however, in coloration, though it shares the peculiarity of having a particoloured tail.

Besides the type specimen, which is now figured, I have seen only one other example of this species, a half-grown individual, sent from Medellin to the British Museum.

3. OCHETODON.

Reithrodon, Leconte, Proc. Ac. Philad. 1853, p. 413 (nec Waterhouse).
Ochetodon, Coues, op. cit. 1874, p. 184.

The North-American Mice with grooved upper incisors were referred by Leconte to Waterhouse's genus *Reithrodon*; and most later writers have followed his example; but Dr. Coues has shown that they are really quite distinct from that Neotropical form, being much more nearly allied to *Hesperomys* proper. They differ from the latter, however, not only in the character already alluded to, but in the first upper molar having four roots instead of three (as in *Hesperomys*), in the inflection of the lower edge of the angle of the mandible, and in other minor cranial characters, which have been fully described by Dr. Coues in his monograph.

The two species of *Ochetodon* which have been found in Central America may be thus distinguished:—

1. *O. humilis.* Average length about 2″·20, of tail 2″, of hind foot 0″·55. Above mouse-grey, washed with fulvous on the flanks; beneath greyish white.
2. *O. mexicanus.* Average length 2″·92, of tail 3″·72, of hind foot 0″·75. Above warm brown, passing into red-brown on the flanks; beneath dirty white.

An allied species, *O. longicauda* (Baird), is found in California, and has been recorded from Guatemala; but, as will be seen presently, the determination of the specimens from the latter locality is doubtless erroneous. It resembles *O. mexicanus* in length of tail and in general coloration, but is a small species, with small hind feet of about 0″·65 in length.

1. **Ochetodon humilis.**

Mus humilis, Bachman, Proc. Ac. Philad. 1841, p. 97 (descr. orig.)[1]; Audubon & Bachman, Quadr. N. Am. ii. p. 103, pl. lxv.[2]

Ochetodon humilis, Coues, Proc. Ac. Philad. 1874, p. 185[3]; Mon. N.-Am. Rodent. p. 123[4].

Reithrodon megalotis, Baird, Mamm. N. Am. p. 451 (1857, descr. orig.)[5]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 43[6].

Hab. North America, from Iowa southwards[4].—Mexico, Sonora (*Kennerly, U.S. Nat. Mus.*[5]), "South Mexico" (*Sallé, Mus. Brit.*).

Two specimens, obtained by the naturalists of the Mexican Boundary Survey between Janos and San-Luis Spring in Sonora, were considered by Professor Baird to differ from the known species of groove-toothed Mice, and were made the types of his *Reithrodon megalotis*[5]. Dr. Coues, however, has no hesitation in identifying them with the present species, remarking that the height of the ear is not greater than occurs in typical *O. humilis*, and that only one of the specimens is larger than United-States examples. He adds that "it is interesting to observe that these two animals do not approximate towards either *O. longicauda* or the still larger and longer-tailed *O. mexicanus*"[4].

According to Audubon and Bachman this little Mouse inhabits grass-fields and plantations in the southern States, and constructs nests of soft grasses, which are either placed under brush-heaps and fences or among long grass. They will breed in captivity, and are very gentle in disposition.

There are two specimens in the British Museum received from Sallé, one of which is marked "S. Mexico;" the label of the other is illegible.

2. **Ochetodon mexicanus.**

Mus tazamaca, Gray, P. Z. S. 1843, p. 79 (sine descr.)[1].

Reithrodon mexicanus, de Saussure, Rev. et Mag. Zool. 1860, p. 109 (descr. orig.)[2]; Tomes, P. Z. S. 1861, p. 284[3].

Ochetodon mexicanus, Coues, Proc. Ac. Philad. 1874, p. 186[4]; Mon. N.-Am. Rodent. p. 128[5]; Alston, P. Z. S. 1876, p. 756[6]; op. cit. 1877, p. 446[7].

Reithrodon sumichrasti, de Saussure, Rev. et Mag. Zool. 1861, p. 3 (descr. orig.)[8].

? *Reithrodon longicauda*, Tomes, P. Z. S. 1861, p. 284 (nec Baird?)[9].

Hab. North America, Louisiana[5].—Mexico (*Sallé, Mus. Brit.*), Vera Cruz (*de Saussure*[2]), Tehuacan, Orizaba, Cordova (*Sumichrast, U.S. Nat. Mus.*[5]), Mirador (*Sartorius, ib.*[5]); Guatemala, Coban (*Mus. Brit.*[1 8 9]), Dueñas (*Salvin, ib.*[3]).

As I have elsewhere pointed out [6], this species was named by Gray in 1843 [1], but, as he gave no description, M. de Saussure's title will stand. The latter author subsequently described a second Mexican species as *Reithrodon sumichrasti* [8]; but it is impossible to distinguish it by the characters given, and I am convinced that it is merely founded on an unusually brightly coloured example of *O. mexicanus*, which seems to gain a greater brilliancy of tint in the more southern parts of its range. Some of Mr. Salvin's Guatemalan specimens were referred by Mr. Tomes to *O. longicauda* (Bd.); but I have been unable to confirm his identification, and agree with Dr. Coues in feeling great doubt as to the existence of that species in Central America.

Nothing special has been recorded of the habits of this species, which doubtless resemble those of the last named. Dr. Coues remarks that one of the specimens of *O. mexicanus* in the Washington Museum "is a perfect albino, pure white everywhere, and doubtless had pink eyes" [7].

4. SIGMODON.

Sigmodon, Say & Ord, Journ. Acad. Philad. iv. p. 352 (1825).

The generic distinction of the Cotton-Rat from the other American Mice has been generally recognized, though Dr. Coues has latterly expressed doubts as to its being more aberrant than some of the subgenera of *Hesperomys* *. Externally it may be best distinguished from the subgenus *Oryzomys* by its blunt muzzle, large ears, and long hind feet, of which the first and fifth toes are subequal and very short. In the skull the perpendicular plate of the zygoma is emarginated, the supraorbital ridges well marked and sharp, and the incisive foramina long. The molars are usually stated not to be tuberculate at any age (Dr. Coues says the tubercles are lost so early that he has not been able to observe the primitive unworn condition); and the indenting enamel-folds are deep and closed, usually giving a somewhat imperfect *sigma* pattern on the crown of at least the posterior teeth, and thus suggesting the mame of the genus, of which only one species appears to be well established.

1. **Sigmodon hispidus.**

Sigmodon hispidum, Say & Ord, Journ. Ac. Philad. iv. p. 354, pl. x. (1825, descr. orig.)[1].
Sigmodon hispidus, Baird, Mamm. N. Am. p. 502 [2]; Coues, Proc. Ac. Philad. 1874, p. 176 [3]; Mon. N.-Am. Rodent. p. 36 [4].
Sigmodon berlandieri, Baird, Proc. Ac. Philad. 1855, p. 333 (deser. orig.)[5]; Mamm. N. Am. p. 504[6]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 46[7]; Tomes, P. Z. S. 1861, p. 281[8].
Hesperomys (*Deilemys*) *toltecus*, de Saussure, Rev. et Mag. Zool. 1860, p. 98, pl. 10. figs. 3, 3*a* (descr. orig.)[9].

Hab. North America, from South Carolina southwards [4].—Mexico (*Cuming, Warwick,*

* Mon. N.-Am. Rodent. p. 32.

Sallé, Mus. Brit.), Vera Cruz (*de Saussure*[9]), Zehuaine, Tehuantepec, Tuxpango, Orizaba (*Sumichrast, U.S. Nat. Mus.*[4]), Mirador (*Sartorius, ib.*[4]); Guatemala, Dueñas (*Salvin, Mus. Brit.*[8]); Panama, Veragua (*Whitely, Mus. Brit.*).

The Cotton-Rat of the Southern United States and of Central America varies considerably in colour, and still more strikingly in the proportional length of the tail and size of the hind foot, Dr. Coues's elaborate tables showing a range of from 2″·25 to 5″·25 in the former, and from 0″·97 to 1″·40 in the latter measurement. Such differences naturally suggest specific distinction; and accordingly they have been the foundations of Professor Baird's[5] and M. de Saussure's[9] species, the extremes in length of tail and foot being found in Mexican specimens. But a careful comparison of the very large series in the Smithsonian Museum has enabled Dr. Coues to show that every intermediate proportion may be found, and that Texan and Mexican individuals differ more from each other than they do from Carolina specimens. The examples to which I have access confirm this view, and I therefore fully concur in the identification of *Sigmodon berlandieri* and *Hesperomys toltecus* with *S. hispidus*.

The range of the Cotton-Rat extends further south than has been hitherto recorded; for, though Dr. v. Frantzius does not appear to have met with it in Costa Rica, specimens have been supplied to the British Museum by Whitely from Veragua. Its habits have been fully described by Audubon and Bachman*, who state that it is gregarious and highly carnivorous.

Mr. Salvin's specimens were obtained at Dueñas, and shot in the open at the edge of some thick grass; the species, he tells me, is not uncommon in that district.

5. NEOTOMA.

Neotoma, Say & Ord, Journ. Acad. Philad. iv. p. 346 (1825).

In the Wood-Rats we have a typically Nearctic genus, represented in Central America by two species, one of which is peculiar to our subregion. Closely allied to the last genus, *Neotoma* has even larger ears and a much longer tail; the skull has no supraorbital ridges, and only short incisive foramina; and the molars, except in aged individuals, have the indenting enamel-folds open and angular, giving the crowns of the teeth very much the prismatic character of those of *Arvicola*. The genus presents two types, according as the tail is densely haired and bushy, as in *N. cinerea* (Ord) of the western territories, or nearly naked, as in the remaining species. To the latter section belong the two forms found within our limits, which differ in the following characters:—

1. *N. floridana.* Upper parts greyish brown, washed with fulvous on the flanks; lower parts white; feet entirely white; tail bicolorous. Average length 9″, of tail 6″.

* Quad. N. Am. i. pp. 230–232.

2. *N. ferruginea.* Upper parts almost uniform rich rufous; lower parts pure white; feet partly dusky; tail unicolorous, dark brown. Average length about 7″, of tail 7″.

The Californian Wood-Rat, *N. fuscipes*, Cooper, agrees most nearly with *N. floridana* in size and in general coloration, but resembles *N. ferruginea* in its proportions and in its dusky feet and unicolorous tail.

1. Neotoma floridana.

Mus floridanus, Ord, Bull. Soc. Philom. Philad. 1818, p. 181 (descr. orig., fide Baird)[1].
Neotoma floridana, Coues, Proc. Ac. Philad. 1874, p. 175[2]; Mon. N.-Am. Rodent. p. 14[3].
Neotoma mexicana, Baird, Proc. Ac. Philad. 1855, p. 333 (descr. orig.)[4]; Mamm. N. Am. p. 490[5]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 44[6].
Neotoma micropus, Baird, Proc. Ac. Philad. 1855, p. 333 (descr. orig.)[7]; Mamm. N. Am. p. 492[8]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 44[9].

Hab. North America, from New England southwards[3].—Mexico, Sonora (*Kennerly*[6], *Emory*[3], *Webb*[3], *U.S. Nat. Mus.*), Charco Escondido, Santa Rosalia (*Couch*, *ib.*[9]), Chihuahua (*Potts*, *ib.*[3]).

Several specimens of *Neotoma* were obtained by the officers of the United-States Boundary Survey in Northern Mexico, which became the types of Professor Baird's *N. mexicana*[4] and *N. micropus*[7]. On a comparison with a larger series, however, Dr. Coues has been unable to recognize the validity of these species—the first having been founded on points of coloration which prove not to be constant, while the latter is based on two very imperfect specimens[2]. Not having an opportunity of investigating the matter for myself, I accept these identifications on Dr. Coues's authority.

According to Mr. A. Schott, this animal "builds its domicile between the forks of mezquite-trees, the deflexed ramifications of which usually form a natural defence against larger intruders. The nest itself is made up of dry sticks, such as the ground underneath such trees is strewn with. There is no regularity in the construction of this house, which resembles, on a smaller scale, those of the Beavers. . . . A common inmate of those rat-nests is a *Sceleporus*, perhaps *S. collaris*, which has its entomophagous sports on the rough bark of the mezquite-tree: thus the Rat and the Lizard live peaceably together. The principal food of this Rat seems to be the pods of the mezquite and the screw-bean, of which large depositories can be found in their strongholds"[6]. There appears, however, to be considerable variety in the habits of the Wood-Rat according to the nature of the country: in some districts it frequents trees; in others it lives among rocks, while elsewhere it builds large conical pyramids, about three feet high, on the surface of the ground.

2. **Neotoma ferruginea.** (Tab. XVI.)

Neotoma ferruginea, Tomes, P. Z. S. 1861, p. 282 (descr. orig.)[1]; Coues, Proc. Ac. Philad. 1874, p. 175[2]; Mon. N.-Am. Rodent. p. 22[3].

Hab. Mexico, Tehuantepec (*Sumichrast, U.S. Nat. Mus.*[3]); Guatemala, Dueñas (*Salvin, Mus. Brit.*[1]).

This very handsome Wood-Rat was first obtained by Mr. Salvin in Guatemala, and was fully described by Mr. Tomes[1]. Subsequently specimens were forwarded by Sumichrast from the southern parts of Mexico to the United-States Museum, as recorded by Dr. Coues[2 3], who remarks that the species furnishes an analogy to *Hesperomys sumichrasti* in its rufous coloration, long dark tail, and partially dusky feet. In the last two of these characters it agrees best with *N. fuscipes*, Cooper, of which it may be regarded as a tropical representative; but its rich ruddy tints are peculiar to itself. Mr. Tomes believed that it also differed from the other species in its dentition; but neither Dr. Coues nor I have been able to confirm the observation, the characters described by Mr. Tomes evidently depending on the age of the specimen described.

Of its habits, which probably agree with those of the last species, nothing has yet been recorded. Mr. Salvin tells me that it is a rare animal near Dueñas, the only place where he found it. During his last visit, in 1873, he was only able to procure one specimen (that now figured); this was brought to him by Indians, who caught it on the banks of the River Guacalate.

6. ARVICOLA.

Arvicola, Lacépède, Mém. de l'Inst. Nat. iii. p. 495 (1801)*.
Hypudæus, Illiger, Prod. Syst. Mamm. p. 87 (1811, nec Keyserling et Blasius).

The characters of this genus, the type of the subfamily *Arvicolinæ,* are so well known that it will be enough to refer to the rhomboidal cranium with divergent supraorbital ridges, rootless or semirooted molars composed of alternate prisms, small fore feet and claws, nearly naked hind feet, and short or moderate tail. The numerous species are mostly characteristic of the Palæarctic and Nearctic faunas; but three have been received from Mexico, belonging to two different subgenera †. They may be recognized by the following diagnoses:—

* It may appear to be inconsistent to retain some of the genera of Lacépède's 'Tableau' while others are rejected as being imperfectly characterized (*suprà*, pp. 3, 6, &c.). It appears to me, however, to be one of those doubtful cases in which discretion may fairly be used for the avoidance of unnecessary changes. *Arvicola* has ever since been in constant use, and has thus established its own legitimacy, while its rejection would cause almost as much confusion as the revival of *Alouatta, Sapajou,* and other justly-forgotten terms.

† In the British Museum there are two skins of Voles, obtained in Mexico by Mr. Charlesworth, which appear to belong to a fourth species; but unfortunately the skulls are wanting, and it is therefore impossible to identify them with any certainty.

A. Myonomes, Coues (ex Rafinesque), Proc. Ac. Philad. 1874, p. 189. "Back upper molars with *two* external triangles and a posterior crescent; middle upper molar with *two* inner triangles; front lower molar with *three* internal and *two* or *three* external lateral triangles" (*Coues*). Claws of fore feet not larger than those of hind feet; soles of latter with *six* tubercles.

1. *A. mexicanus.* Upper parts dark brown, washed on the sides with rufons; lower parts grey, tinged on the breast with yellow; feet dusky. Ears moderate, hairy, with a well-developed antitragus. Tail hairy, indistinctly bicolorous, somewhat longer than the hind foot. Length of head and body about 4″·25, of tail 1″·00 to 1″·15, of hind foot 0″·72.

B. Pitymys, M^c^Murtrie, Amer. ed. of Cuvier's Règn. An. i. p. 434 (1831, fide Baird). "Back upper molar with *one* external angle and a posterior trefoil; middle upper molar with *one* internal angle; front lower molar with *two* internal and *one* external triangle" (*Coues*). Claws of fore feet longer than those of hind feet; soles of latter with *five* tubercles; fur fine, glossy.

2. *A. pinetorum.* Upper parts brown, more or less tinged with rufous; lower parts silvery grey; tail shorter than the head, but distinctly longer than the hind foot. Length of head and body about 3″·60, of tail 0″·70, of hind foot 0″·63.

3. *A. quasiater.* Upper parts almost black, shaded with dark chestnut, and passing into the blackish ash of the lower parts. Tail little longer than the hind foot. Length of head and body about 4″·33, of tail 0″·70, of hind foot 0″·66.

It may here be observed that the Musquash or Musk-Rat, *Fiber zibethicus* (Schreber), is found in New Mexico and Arizona; but we have no evidence of its existence within our present limits.

1. Arvicola mexicanus.

Arvicola (*Hemiotomys*) *mexicanus*, de Saussure, Rev. et Mag. Zool. 1861, p. 3 (descr. orig.)[1].

Hab. Mexico (*de Saussure*[1]), San Juan (*Rébouch, Mus. Brit.*), Tehuantepec (*Boucard, Mus. Brit.*).

It is with great hesitation that I provisionally retain this Vole as specifically distinct from the well-known *Arvicola riparius*, Ord, of North America. M. de Saussure's short diagnosis, quoted below*, is all that has yet been published on the subject, so far as I am aware; and it appears to have escaped the keen research of Dr. Elliott Coues. Mr.

* "Medius, supra fuscus, subtus cinerascens, pilis cinereis, apice fuscis. Auriculæ sat magnæ, fimbriatæ, antitrago magno. Vibrissæ capite breviores, fuscæ. Pedes antici paulo longiores posteriorum dimidio; postici elongati, subtus basi pilosi, tuberculis 6 instructi, quorum posticus magnus, penultimus minutus [sic]. Ungues anteriores posterioribus haud majores. Cauda brevissima, pedibus posticis paulo longior at capite brevior. Corporis longitudo 0·110; caudæ 0·019; pedis postici 0·016."

Oldfield Thomas, however, has called my attention to two spirit-specimens in the British Museum, received from Tehuantepec through M. Boucard, and to a skin, also obtained in Mexico by M. Rébouch, which agree in all essentials. On examination, I find that their dentition is identical with that of *A. riparius*; but, as Dr. Coues has remarked, the teeth of all the species of the subgenus *Myonomes* agree in pattern. One of these examples has the tail even shorter than the measurement given by M. de Saussure; in another it is longer, although still falling considerably short of Dr. Coues's average for *A. riparius*; while that of the third has unfortunately been lost. It is to be noted, however, that one of the most southern specimens examined by the latter zoologist, from Louisiana*, had an even shorter tail than the Tehuantepec example in the British Museum; and I have little doubt that when a sufficient series of Mexican Voles is available for study it will be found that *A. mexicanus* gradually passes into the longer-tailed and larger-footed northern form.

The subgenus *Myonomes*, revived by Dr. Coues from Rafinesque†, is identical with the *Hemiotomys* of Professor Baird‡, but not with M. de Selys-Longchamps's group of that name§, which is founded on the European Water-Vole, *Arvicola amphibius*, Linn. *Myonomes* is certainly very closely allied to the *Arvicola* proper of Blasius, if it does not prove to be identical with that subgenus.

2. **Arvicola pinetorum.**

Psammomys pinetorum, Le Conte, Ann. Lyc. New York, iii. p. 133, t. ii. (1829, descr. orig.)[1].
Arvicola (*Pitymys*) *pinetorum*, Baird, Mamm. N. Am. p. 544[2]; Coues, Proc. Ac. Philad. 1874, p. 191[3]; Mon. N.-Am. Rodent. p. 219[4].

Hab. North America, from Massachusetts southward[4].—Mexico (*Verreaux*, *Mus. Brit.*), Parada, Rancheria del Jacale (*Sallé*, *Mus. Brit.*).

The most southern localities which Dr. Coues gives for the Pine-Vole are the States of Mississippi and Louisiana; but it appears to extend far into Mexico, from which country there are three skins in the British Museum which I am quite unable to distinguish from the more northern animal. One of these specimens is labelled by Sallé as having been obtained at the Rancheria del Jacale, at an elevation of 12,000 feet and near the eternal snow.

3. **Arvicola quasiater.**

Arvicola (*Pitymys*) *pinetorum*, var. *quasiater*, Coues, Proc. Ac. Philad. 1874, p. 191 (descr. orig.)[1].
Arvicola (*Pitymys*) *quasiater*, Coues, Mon. N.-Amer. Rodent. p. 226[2].

* Mon. N.-Am. Rodent. p. 184.
‡ Mamm. N. Am. p. 515 (1857).
† *Cf. suprà*, p. 156.
§ Rev. Zoolog. x. p. 310 (1847).

Hab. Mexico, Jalapa (*de Oca, U.S. Nat. Mus.*[2]), Tuxpango (*Sumichrast, ib.*[2]).

This very dark and glossy-furred Vole was first described by Dr. Coues as a variety of the last species[1]; but he subsequently convinced himself that it was quite distinct[2]. Reluctance to injure the type specimens unfortunately prevented his describing the skull and teeth; and further observation is consequently required before its relationship with *A. pinetorum* is set at rest.

Fam. IV. GEOMYIDÆ.

1. GEOMYS.

Geomys, Rafinesque, Am. Month. Mag. ii. p. 45 (1817, fide Baird, Mamm. N. Am. p. 368).
Diplostoma, Rafinesque, loc. cit.
Saccophorus, Kuhl, Beitr. Zool. &c. p. 65 (1820).
Pseudostoma, Say, Long's Exped. i. p. 406 (1823).
Ascomys, Lichtenstein, Abh. Ak. Berl. 1822–23, p. 20 (1825).

The family Geomyidæ is distinguished, among other characters, by the possession of cheek-pouches which open externally on the sides of the face, and are not connected with the mouth—a structure which is not found in any other known Mammal. In geographical distribution it is principally Nearctic; but all the five genera are represented in our subregion. The group presents two very distinct types, which have been sometimes regarded as deserving of full family rank; but in spite of the arguments of Dr. Coues in favour of that course*, I still hold to the view that they may best be treated as subfamilies under the names Geomyinæ and Heteromyinæ†.

Of these the first contains thickset fossorial animals with short limbs and tails, rudimentary ear-conchs, and massive skulls, in which the mastoids do not appear on the top of the cranium, and the zygomatic arches are stout and divergent. They fall naturally into two genera:—*Geomys*, with deeply channelled incisors, and very large fore feet and claws; and *Thomomys*, in which the incisors are either plain or only slightly grooved near the margin, the fore feet moderately developed, and the skull less massive.

* See his observations, Proc. Ac. Philad. 1875, pp. 130–138, 272–327; Powell's Exploration of the Colorado River, pp. 217–285; and Mon. N.-Am. Rodent. pp. 487–542, 607–629; which contain very detailed descriptions of the anatomy and characters of the known genera and species.

† *Cf.* P. Z. S. 1876, p. 69. With regard to the name of the latter subfamily it may be observed that Dr. Coues appears to think it unnecessary to change *Saccomyinæ*, Baird, into *Heteromyinæ*, Alston. Dr. Coues himself confesses that there is "no doubt" that *Saccomys* is only a synonym of *Heteromys*; and it appears to me that the laws of nomenclature and of convenience both require that the latter name should be used in composing the title of any superior group.

The two species of *Geomys* found within our limits may be easily recognized by the following striking characters:—

1. *G. mexicanus.* Upper incisors with a single *median* groove; feet and tail hairy; fur soft and shining. Brownish or reddish grey above, paler beneath; length of head and body 10″ to 11″, of tail 3″.
2. *G. hispidus.* Upper incisors with one groove on the *inner half* of the tooth; feet and tail nearly naked; fur stiff and coarse. Dull chocolate-brown above, paler beneath; length of head and body 12″, of tail 3″.

The only other species in which the incisors have only one groove is *G. castanops* (Baird) of Texas and New Mexico, a much smaller animal, of a pale yellow-brown colour, passing into chestnut on the head.

1. Geomys mexicanus.

Ascomys mexicanus, Lichtenstein, Abh. Ak. Berlin, 1827, p. 113 (1830, descr. orig.)[1]; Charlesworth, P. Z. S. 1841, p. 60[2].

Geomys mexicanus, Baird, Mamm. N. Am. p. 387[3]; Coues, Rep. Powell's Expl. Colorado River, p. 236[4]; Proc. Ac. Philad. 1875, p. 133[5]; Mon. N.-Am. Rodent. p. 617[6].

Tucan seu *Talpa Indica*, Hernandez, Quad. Nov. Hisp. fol. 7, cap. xxiv.

Tuça, Tuza, of Mexicans.

Hab. Mexico (*Uhde, Deppe, Mus. Berol.*[1]; *Liebmann, Mus. Hafn.*; *Geale, Mus. Brit.*), Jalapa (*de Oca, U.S. Nat. Mus.*[6]).

There can be hardly a doubt that the Mexican Pocket-Gopher is the *Tucan* of Hernandez, and consequently the earliest-known species of the family, though it was first systematically named by Lichtenstein in 1830[1]. Little is known of its exact distribution in Mexico, but it appears to inhabit the central highlands; in some places it occurs along with the next species, specimens of both having been sent by de Oca to the Smithsonian Institution from Jalapa[6]. Dr. Coues quotes Berlandier's unpublished manuscripts to the effect that *G. mexicanus* is found in the cold and temperate regions of New Spain[5]; and Mr. Charlesworth also met with it on the central tableland. The latter observer states that the cheek-pouches "are used for the purpose of conveying the soil from its subterranean retreats to the surface of the ground, where the mould is deposited in heaps similar in appearance to those formed by the common Mole"[2].

The British Museum possesses two examples of melanism in this animal; these specimens, which are without exact localities, are of a very dark glossy brown, but retain irregular patches of their normal colour.

2. Geomys hispidus.

Ascomys mexicanus, Eydoux & Gervais, Mag. de Zool. 1836, art. i. p. 23, t. xxi. figg. 5 & 6[1]; Voy. de la 'Favorite,' v. Mamm. p. 23, t. viii. figg. 5 & 6 (nec Lichtenstein)[2].

Saccophorus quachil, Gray, P. Z. S. 1843, p. 79 (sine descr.)[3].

Geomys hispidus, Le Conte, Proc. Ac. Philad. 1852, p. 158 (descr. orig.)[4]; Baird, Mamm. N. Am. p. 386[5]; Coues, Proc. Ac. Philad. 1875, p. 133[6]; Rep. Powell's Expl. Colorado River, p. 229[7]; Mon. N.-Am. Rodent. p. 619[8]; Alston, P. Z. S. 1877, p. 446[9].

Geomys heterodus, Peters, Monatsb. Ak. Berl. 1864, p. 177 (descr. orig.)[10]; Frantzius, Arch. f. Naturg. xxxv. 1. p. 269[11].

Taltusa of Guatemalans (common to *Heteromys longicaudatus*).

Hab. Mexico, Vera Cruz (*Pease*, *Mus. Ac. Philad.*[5]), Jalapa (*de Oca*, *U.S. Nat. Mus.*[8]), Necostla (*Sumichrast*, *ib.*[8]), Tehuantepec (*Boucard*, *Mus. Brit.*), Yucatan (*Gaumer*, *Mus. Boucard*); Guatemala, Dueñas (*Salvin & Godman*, *Mus. Brit.*; *Boucard*, *Mus. Berol.*), Coban (*Mus. Brit.*[3]), Guatemala city (*Van Patten*, *U.S. Nat. Mus.*[8]); Costa Rica (*Zeledon & Carmiol*, *ib.*[8]), Irazú (*Hoffmann & Frantzius*, *Mus. Berol.*[10 11]).

The Central-American Pocket-Gopher, although a very distinct species, has often been confused with *G. mexicanus*, its teeth having even been figured by Eydoux and Gervais under that title[1 2]. The late Dr. Gray mentioned it as *Saccophorus quachil* in 1843[3 9]; but it was not till 1852 that the species was described by Le Conte[4]. Not being acquainted with the latter's diagnosis, Professor Peters gave the name of *G. heterodus* to an example sent by Hoffmann from Costa Rica[10]; but his type proves identical with Mexican specimens.

This species appears to replace the last in the hotter parts of Mexico and in the other Central-American States, extending at least as far south as Costa Rica, where Dr. v. Frantzius tells us it abounds in the high-lying region on the southern and south-western slopes of the Volcano of Irazú up to an elevation of 8000 feet, especially where the ground is dry owing to an admixture of volcanic ashy sands. "Goffers are also found in the hot valley of Matina and on the River Sarapiqui, where they do great damage to the roots of the cacao-trees; but as I have never seen specimens from thence, I cannot say whether they belong to the same species or not. In the maize-fields of Irazú their number is so great that at every step you are in danger of your foot sinking into one of their subterranean passages; and it is consequently often necessary to relinquish the cultivation of maize for a year or two and to lay down the ground in pasture, when the cattle tramp down the passages and so disturb the Goffers that they seek some other place of abode. The damage which they do to the maize-crop is great; for they carry off great quantities of the ears in their cheek-pouches and convey them to their subterranean store-houses. On the surface this species, like its congeners, is very helpless" [11].

In Guatemala I am informed by Messrs. Godman and Salvin that this species is very common all over the highlands, and traces of their presence are to be met with almost everywhere in the neighbourhood of Dueñas; but it is an animal that is only seen by the rarest chance, so that only two or three specimens were brought to them by Indians;

and these were all killed with a blow from the machete or bush-knife an Indian always carries with him. The underground workings of these animals show themselves in the heaps of mould cast up here and there in the track, reminding one of the similar labours of the common Mole in Europe. But the underground passage is of considerable size, so as to cause much annoyance if the surface above gives way under the foot of a passer by. In the upper parts of the Volcan de Fuego, at an altitude of from 10,000 to 13,000 feet, similar workings are very abundant in the loose volcanic soil: but Messrs. Godman and Salvin never succeeded in obtaining a specimen from there; so that it is not certain by what species these workings are made, though probably by this animal, so common at a lower elevation.

Two specimens of this Gopher in the Berlin Museum (one labelled as being from Peten, the other without locality) are irregularly marked with white, which forms a broad but interrupted band over the loins.

2. THOMOMYS.

Thomomys, Max. zu Wied, Nov. Act. Acad. Cæs. Leop.-Car. xix. p. 23 (1839).

The principal external distinctions between this genus and the last have already been noticed in comparison; but it should be added that the striking characters afforded by the plain incisors, well-developed ear-conch, and moderately clawed feet of *Thomomys* are supported by a number of cranial differences, which have been worked out in great detail by Dr. Coues*. That zoologist has pointed out another point in which the two genera do not agree—namely, "that in *Geomys* a number of species appear to have become firmly established, while the differentiation of *Thomomys* has not progressed so far." With much more material than any previous writer has enjoyed, Dr. Coues recognizes only two species of *Thomomys*; one of which, *T. talpoides* (Richardson), is divisible into three geographical races, inhabiting respectively the northern interior, the Pacific coast, and the southern interior of the North-American continent, but each intergrading into the other. The southern type, formerly kept separate as *T. umbrinus* (Richardson), is small in size, the length of the head and body averaging about 6″·50, and that of the tail 2″·20. Its colour is very variable, presenting various shades of fawn, reddish-brown, brown, and greyish-brown, the lower parts being only paler than the upper. There are usually some blackish markings about the nose and mouth; and occasionally, as in the other races, the animal is jet-black all over.

The only other *Thomomys* to which Dr. Coues grants specific distinction is his own *T. clusius*†, founded on a single specimen from the Rocky Mountains. This appears to be a much smaller animal than any of the races of *T. talpoides*, and to be distinguished by its very short tail and by its lower parts and limbs being pure white.

* Rep. Powell's Expl. Colorado River (1875), pp. 217–285.

† Proc. Ac. Philad. 1875, p. 138 (descr. orig.); Mon. N.-Am. Rodent. p. 629, pl. vii.

1. Thomomys talpoides.

Cricetus talpoides, Richardson, Zool. Journ. iii. p. 518 (1828, descr. orig.)[1].
Thomomys talpoides, Baird, Mamm. N. Am. p. 403[2]; Coues, Proc. Ac. Philad. 1875, p. 135[3]; Rep. Powell's Expl. Colorado River, p. 205[4]; Mon. N.-Am. Rodent. p. 623[5].
Geomys umbrinus, Richardson, Faun. Bor.-Amer. i. p. 202 (1829, descr. orig.)[6].
Thomomys umbrinus, Baird, Mamm. N. Am. p. 399[7]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 41[8].
Thomomys talpoides umbrinus, Coues, Mon. N.-Am. Rodent. p. 628[9].

Hab. North America, from the Assiniboine River southwards[5].—Mexico, Sonora, Santa Cruz (*Clark, U.S. Nat. Mus.*[8]), Espia (*Kennerly, ib.*[8]).

This species was found by the naturalists of the United-States Boundary Survey to be plentiful in the northern States of Mexico; but its exact southern range is still unknown. According to the observations of Messrs. Clark and Kennerly it seldom appears on the surface of the ground, and then only before sunrise. "It seldom exposes the whole of its body in daylight. On coming to the surface, if the grass is sufficiently near to be reached, it seizes a sprig and drags it within the entrance [of its burrow], and with its fore feet packs it away in its pouches; when this operation is complete the opening [of the burrow] is filled up with loose earth, which has been aptly described by suggesting its resemblance to the emptied contents of a flower-pot." When surprised at any distance from its hole the animal becomes bewildered, and is then easily captured[8].

3. DIPODOMYS.

Dipodomys, Gray, Ann. & Mag. Nat. Hist. vii. p. 521 (1840).
Macrocolus, Wagner, Arch. f. Naturg. xii. 1, p. 172 (1846).

As already indicated, the members of the subfamily Heteromyinæ differ greatly in appearance from the Geomyinæ, being slender Jerboa-like Rodents, with elongated hind limbs and tail. Their skulls are comparatively delicate, with slender zygomatic arches; and usually with enormously developed mastoids, which often occupy a considerable part of the top of the cranium as well as of its occipital surface. Of the three well-marked genera now known, the present is characterized by its densely haired tail and soles, plain ungrooved incisors, rootless molars, and remarkable skull, in which the inflation of the temporal regions is carried to an extreme.

Two species of the genus *Dipodomys* have usually been recognized, agreeing in their peculiar tawny mouse-colour, with white-striped heads, haunches, and tails, but differing in size and proportions. There is no doubt that the *Dipodomys* of the Rocky-Mountain subregion, *D. ordi,* is usually a larger and stouter animal, with a proportionally shorter tail and lighter coloration than the *D. phillipsi* of the Pacific slopes. But Dr. Coues finds such a perfect series of gradations, that he treats the former

as a geographical race or "subspecies" of the latter. I have no opportunity of examining a sufficient series of specimens to warrant the expression of an independent opinion; but Dr. Coues's descriptions and tables of measurement appear to be conclusive, and I therefore follow him in recognizing only one species of *Dipodomys*, varying in length of head and body from about 3″·25 to 5″, and in that of tail from 5″ to 7″. The upper parts are of a darker or paler tawny brown; and the head, thighs, and tail are adorned with longitudinal stripes of pure white.

1. Dipodomys phillipsi.

Dipodomys phillipii, Gray, Ann. & Mag. Nat. Hist. vii. p. 521 (1840, descr. orig.)[1].
Dipodomys phillipsi, Coues, Proc. Philad. Ac. 1875, p. 325[2]; Mon. N.-Am. Rodent. p. 540[3].
Macrocolus haltecus, Wagner, Arch. f. Naturg. xii. 1, p. 176 (1846, descr. orig.)[4].
Dipodomys ordii, Woodhouse, Proc. Ac. Philad. 1853, p. 223 (descr. orig.)[5]; Baird, Mamm. N. Am. p. 410[6]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 42[7]; Dugès, La Nat. i. p. 138[8].
Dipodomys phillipsi ordi, Coues, Proc. Ac. Philad. 1875, p. 326[9]; Mon. N.-Am. Rodent. p. 541[10].

Hab. North America, from Washington Territory southwards[3].—Mexico[4], Sonora, Santa Cruz (*Clark, U.S. Nat. Mus.*[7]), Durango (*Webb, ib.*[7]), Coahuila, Real del Monte (*Phillips, Mus. Brit.*[1]), San Luis and Guanajuato (*Dugès*[8]).

Phillips's Pocket-Rat appears to be pretty generally distributed throughout the more Northern States of Mexico, Guanajuato being the most southern locality with which I am acquainted. Mr. Clark, of the United-States Boundary Survey, observes that in Sonora these Rats make large piles of loose earth on the surface of the ground, each of which has several entrances about the base, leading into the hollow interior[7]. In Arizona it appears to have accepted advancing civilization with greater philosophy than some of the higher Mammals. Dr. Coues remarks that "Since the erection of buildings in the interior of Arizona the Kangaroo-Rat has in great measure taken up its residence about them, showing the same adaptability to semi-domestication that the House-Mouse exhibits. Many used to live in our storehouses and granaries at Fort Whipple, and even brought forth their young there, in just such nooks as the common Mouse would select. Parturition occurs in May or June, though more than one litter may be produced in one season. The young are for some time much darker and greyer than their parents. Although sullen and apparently much cowed when first caught, these Rats soon become familiar and make agreeable pets. I have frequently seen them enter my tent at night when all was still and search about for food. They ordinarily move on all-fours, with a motion not unlike that of a Rabbit when leisurely moving about. The body is alternately strongly arched and extended; the long hind feet rest on the ground to the heel, and the heavy tail trails straightly after. If frightened, this easy motion is changed to a succession of astonishingly vigorous leaps" *.

* 'American Naturalist,' i. p. 396.

I have followed Dr. Coues in the spelling of the specific name of this animal, which Gray wrote *phillipii*; for it was avowedly named in honour of Mr. Phillips, who sent home the original type specimen.

4. PEROGNATHUS.

Perognathus, Max. zu Wied, Nov. Act. Ac. Cæs. Leop.-Car. xix. 1, p. 369 (1839).

In this genus we have a less specialized type than *Dipodomys*, characterized by its grooved incisors, rooted molars, sparsely haired tail, and more or less naked soles; while the peculiar modification of the skull is not carried nearly so far as in the last genus.

About six species, all natives of the central and western regions of the North-American continent, appear to be well established. Of these, two have been separated by Professor Baird * and by Dr. Elliott Coues † under the name of *Cricetodipus*, the former writer treating the group as a subgenus, while the latter raised it to full generic rank ‡. It is true that *Perognathus flavus* and *P. parvus* not only differ from the other species in the minor external features pointed out by Professor Baird, but that Dr. Coues has demonstrated certain cranial characters which show some approach to the last genus, and which are, in his opinion, "fully up to the current generic mark." But as these differences are mostly of a comparative nature, and as all the species appear to be very closely allied in essentials, I prefer to revert to Professor Baird's views, and to regard *Cricetodipus* as a subgenus of *Perognathus*. Following this line, the three Mexican Pocket-Mice may be thus diagnosed:—

A. *Cricetodipus* (Baird, ex Peale). Ears with no tragal or antitragal lobes. Soles hairy on their posterior half. Auditory bullæ projecting somewhat behind the occipital plane.

1. *P. flavus*. Upper parts pale fulvous, mixed with blackish; lower parts and limbs white; a bright fulvous stripe along the flanks. Average length of head and body above 2″, of tail nearly the same.

B. *Perognathus* (proper). Ears with a lobe on the antitragus and usually on the tragus. Soles naked to the heel, at least along the centre. Auditory bullæ hardly projecting behind the occipital plane.

2. *P. hispidus*. Upper parts "yellowish cinnamon, closely lined with blackish"; lower parts and limbs white; a fulvous stripe along the flanks. Length of head and body about 3″·25, of tail rather more.

* Mamm. N. Am. p. 418 (1857). † Mon. N.-Am. Rodent. p. 515 (1877).

‡ The name *Cricetodipus* was first applied by Peale to his *C. parvus* (U.S. Expl. Exp. i. p. 53, 1848, descr. orig.), with which Professor Baird identified a Californian specimen now in the United-States National Museum. Dr. Coues regards Peale's species as uncertain, and founds his genus on the "*C. flavus* of Baird" (Mon. N.-Am. Rodent. p. 516).

3. *P. fasciatus.* Upper parts "light sandy yellowish, closely lined throughout with black;" lower parts and limbs white; a salmon-coloured stripe along the flanks. Length of head and body about 4″·25, of tail considerably less.

The other three species (*P. parvus*, Baird, *P. monticola*, Baird, and *P. penicillata*, Woodhouse) are all found in California, and very possibly cross our northern frontier. But the only other species which has yet been recorded from Central America is the *P. bicolor* of Gray, which, as I have shown elsewhere, is neither a *Perognathus* nor a native of the subregion *.

1. Perognathus flavus.

Perognathus flavus, Baird, Proc. Ac. Philad. 1855, p. 332 (deser. orig.)[1]; Mamm. N. Am. p. 423[2]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 42[3].
Cricetodipus flavus, Coues, Proc. Ac. Philad. 1875, p. 300[4]; Mon. N.-Am. Rodent. p. 516[5].

Hab. North America, central regions, from the Dominion of Canada southwards[5].—Mexico, Chihuahua (*Webb, U.S. Nat. Mus.*[3]), Matamoras (*ib.*[5]).

Although rare in collections, this diminutive Pocket-Mouse was found by the officers of the United-States Boundary Survey to be "quite abundant throughout the west, from the lower Rio Grande to El Paso, and a considerable distance westward"[3]. According to Dr. Coues, its range is a tolerably extensive one, extending southwards from 49° north latitude throughout the Rocky-Mountain and Middle-Faunal Provinces of North America to the more northern States of Mexico. On the Pacific slopes it is replaced by *P. parvus* (Baird), which apparently only differs in having the tail and hind feet longer, and may very probably prove to be merely a geographical race of *P. flavus*.

2. Perognathus hispidus.

Perognathus hispidus, Baird, Mamm. N. Am. p. 421 (1857, descr. orig.)[1]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 42[2]; Coues, Proc. Ac. Philad. 1875, p. 296[3]; Mon. N.-Am. Rodent. p. 513[4].

Hab. Mexico, Charco Escondido, Matamoras (*Couch, U.S. Nat. Mus.*)[1].

Nothing whatever has been added to our knowledge of this animal since its first description, the two type specimens obtained by Lieutenant Couch being still the only ones known.

* *Cf.* Ann. & Mag. Nat. Hist. 5th series, vi. pp. 118, 119; where I have redescribed the type specimens under the name of *Heteromys bicolor*, and shown that they were sent to the British Museum by Dyson from Venezuela, and not (as stated by Gray) by Sallé from Honduras.

3. Perognathus fasciatus.

Perognathus fasciatus, Max. zu Wied, Nov. Act. Ac. Cæs. Leop.-Car. xix. 1, p. 369 (1839, descr. orig.)[1]; Baird, Mamm. N. Am. p. 420[2]; Coues, Proc. Ac. Philad. 1875, p. 283[3]; Mon. N.-Am. Rodent. p. 500[4].

Hab. North America, central regions, from Nebraska southwards[4].—Mexico, Chihuahua city (*Potts, U.S. Nat. Mus.*[2]).

The naturalists of the United-States Boundary Survey do not appear to have met with this, the largest known species of *Perognathus*; but both Professor Baird[2] and Dr. Coues[4] have examined specimens from the State of Chihuahua: thence its range appears to extend northwards, between the Rocky Mountains and the Mississippi, through Texas and Kansas to Nebraska.

The only observation on the habits of any species of *Perognathus* with which I am acquainted refers to *P. fasciatus*, and is contained in a brief note by Dr. G. Lincecum, who states that it lives in burrows eight to ten inches deep, with subterranean galleries and having several outlets *.

5. HETEROMYS.

Heteromys, Desmarest, Mammalogie, p. 313 (1820).
Saccomys, Fréd. Cuvier, Mém. du Mus. x. p. 419 (1823).

This genus presents us with a combination of the ungrooved incisors of *Dipodomys* and the rooted molars of *Perognathus*, combined in most of the forms, if not in all, with a bristly pelage, in which many of the hairs are developed into fine flattened spines. The skull has the temporal region less inflated than is the case in the other genera, and is also distinguished by the sharpness of its supraoccipital ridges and the breadth of the interparietal. Little has hitherto been recorded of the details of its structure, for which we must wait the publication of Dr. Murie's promised anatomical monograph.

Of several described species of *Heteromys* only four appear to me to be well established—namely, *H. anomalus* (Thompson) from Trinidad, *H. bicolor* (Gray) from Venezuela †, and the two following Central-American forms:—

1. *H. desmarestianus*. Dull chestnut-brown above, extending to the carpal and tarsal joints, tips of spines dark brown; lower parts and feet white. Length of head and body about 5″·15, of tail 4″·75.
2. *H. longicaudatus*. Mouse-grey, more or less mixed with tawny, varying in extension on limbs, tips of spines black; lower parts and feet white. Length of head and body about 5″, of tail from 4″·50 to 5″·50.

* 'American Naturalist,' vi. pp. 369, 370.

† *Cf. suprà*, p. 165.

1. **Heteromys desmarestianus.** (Tab. XVII. fig. 1.)

Heteromys desmarestianus, Gray, P. Z. S. 1843, p. 79 (sine descr.)[1]; op. cit. 1868, p. 204 (descr. orig.)[2]; Alston, op. cit. 1877, p. 446[3].

Hab. Guatemala, Coban (*Mus. Brit.*[1]).

Of this species nothing is known save Gray's type in the British Museum, which is represented in our figure. It has very much the general coloration of *H. anomalus*, but differs both in size and in its dark-pointed spines. From no specimens being included in Mr. Salvin's collections, it is probable that the species is very rare in Guatemala.

2. **Heteromys longicaudatus.** (Tab.XVII. fig. 2.)

Heteromys melanoleucus, Gray, P. Z. S. 1868, p. 204 (descr. orig.)[1].
Heteromys longicaudatus, Gray, loc. cit. (descr. orig.)[2].
Heteromys irroratus, Gray, tom. cit. p. 205 (descr. orig.)[3].
Heteromys albolimbatus, Gray, loc. cit. (descr. orig.)[4].
Heteromys adspersus, Peters, Monatsb. Ak. Berl. 1874, p. 357 (descr. orig.)[5].
Taltusa of Guatemalans (common to *Geomys hispidus*).

Hab. Mexico (*Sallé*, *Mus. Brit.*[2]), Oaxaca (*Sallé*, *ib.*[3]), La Parada (*Sallé*, *ib.*[4]); Guatemala, Dueñas (*Godman & Salvin*, *Mus. Brit.*); Costa Rica (*Mus. Brit.*); Panama (*Boucard*, *Mus. Berol.*[5]).—South America, Colombia, Venezuela.

After a careful study, I have been quite unable to find any valid specific distinctions between the specimens on which the late Dr. Gray bestowed the names of *Heteromys melanoleucus*[1], *H. longicaudatus*[2], *H. irroratus*[3], and *H. albolimbatus*[4]; and an examination of the type of Professor Peters's *H. adspersus*[5] proves that it belongs to the same somewhat variable species. In colour the British-Museum specimens do not differ so much as one would gather from Gray's very misleading descriptions. It is painful to have to point out the numerous errors into which that voluminous writer fell in the present case; but it is absolutely necessary that this should be done. *H. melanoleucus* is *not* from "Honduras," but was sent by Dyson from Venezuela, as shown by the Museum register. Its fur is *not* "black," but of a warm tawny mouse-grey, little darker than that of the other "species." The specimen named *H. irroratus* shows a slight tinge of pale fawn along the edge of the darker colouring, but *not* a "widish interrupted yellow line;" while the two types of *H. albolimbatus* differ from one another in the extension of colour on the fore limbs*. Nor can any trust be placed in the other characters on which Gray depended, as the length of the tail, the hairiness of the ears, and the comparative softness or harshness of the fur. Thus a

* The locality of these examples is given by Gray as "La Parda (*Feirecier*);" but their labels bear "La Parada, Février 1861," in Sallé's handwriting.

specimen from Guatemala is nearly as dark as "*melanoleucus*," has the proportionally short tail of "*irroratus*," and is strictly intermediate in the hairiness of its ears. The tail of the type of *H. longicaudatus* has been skinned and obviously much stretched; but as this is the only one of Gray's names which is not absolutely misleading, it should now be retained.

The range of this species extends from Southern Mexico to Colombia, whence it was sent by Salmon to the British Museum, and to Venezuela, which is the true habitat of "*H. melanoleucus*." Dr. v. Frantzius does not appear to have met with it in Costa Rica; but there is an example from that country in the British Museum. Messrs. Godman and Salvin tell me that it is a scarce animal in Guatemala. There is a specimen in the Museum of the capital of that republic with the cheek-pouches turned inside out, but with no record of where it was captured; and the only examples they obtained were caught by Indians near Dueñas: one of these last is the subject of our figure.

[OCTODONTIDÆ.]

In my general observations on the present order* I remarked that the important Neotropical family of Octodontidæ was represented in the Central-American fauna by a single form, *Myopotamus*. I much regret to find that I have been led into a misstatement. The source of error lies in the following passage in Dr. v. Frantzius's oftenquoted paper:—"According to oral information received from J. Carmiol, a botanist and zoological dealer resident in Costa Rica, an animal is found on the San Carlo River, which, from his description, I consider must be either *Hydrochœrus capybara* or *Myopotamus coypus*. From correspondence with Professor Baird it appears that the latter has also been found in Guatemala by Salvin; and it is therefore very probable that the animal seen by Carmiol is the Coypu, in which case it is doubtless to be found in other parts of Central America"†. It was on the last sentence that I relied; for Señor Carmiol's "description" must have been of the vaguest sort; but on applying (somewhat late in the day perhaps) to Mr. Salvin for further particulars, I find that either Professor Baird or Dr. v. Frantzius must have made a mistake, and that he never saw or heard of the Coypu in Central America.

Besides *Myopotamus coypus*, Dr. v. Frantzius has claimed *Octodon degus* (Molina) as a native of Costa Rica, on the strength of a specimen which he received from Turialba in 1859. Unfortunately the skin was lost on its way to Europe, so that all the material for identification left was the following short description which the Doctor had drawn up:—"The pencilled tail and the rounded nail of the thumb of the fore foot left no doubt that it was a species of Octodon. The colour of the soft fur was grey-brown above, lighter below; the length of the body was $4\frac{1}{2}$ inches, of the tail the same; the whiskers had a length of $2\frac{1}{2}$ inches, and stood up above the occiput." On examining

* *Suprà*, p. 120.

† Arch. f. Naturg. xxxv. 1, p. 275.

specimens of *O. degus* when he returned to Europe, Dr. v. Frantzius unhesitatingly referred his lost specimen to that species*. It appears to me, however, that the above description might apply as well to a *Hesperomys* of the subgenus *Nyctomys*† as to an Octodon.

As far as I am aware, no species of Octodon has yet been met with further north than the Peruvian Andes, while the Coypu does not appear to advance beyond Central Chili‡. Both forms are highly characteristic of the Patagonian subregion; and their occurrence in Central America is extremely improbable.

Fam. V. HYSTRICIDÆ.

1. SYNETHERES.

Coendu, Lacépède, Mém. de l'Inst. Nat. iii. p. 496 (1801)§.
Synetheres et *Sphiggurus,* Fréd. Cuvier, Mém. du Mus. ix. p. 427 (1822)‖.
Cercolabes, Brandt, Mém. Ac. Pétersb. (6me sér.) iii. p. 391 (1835).

Of the three American genera of Porcupines constituting the subfamily Synetherinæ, the typical genus *Synetheres* is clad with short spines more or less mixed with long harsh hair, and has a long prehensile tail. The hind feet have only four toes, but their soles are expanded on the inner edge by a broad lobe which is supported by two accessory tarsal ossicles.

All the species are Neotropical, their place being taken in North America by the allied genus *Erethrizon*. The only one found in Central America, *Synetheres mexicanus*, belongs to the section or subgenus *Sphingurus*, in which the spines are hidden by the long hair. It is at once distinguished from its nearest allies, *S. villosus*, F. Cuvier, and *S. melanurus*, Wagner, by its black colour and by the tufts of spiny bristles which are concealed by the fur of its lower parts. The length of the head and body is about 20″ to 22″, and of the tail 12″ to 16″.

* *Tom. cit.* pp. 275, 276.

† *Cf. suprà*, p. 143.

‡ Dr. v. Tschudi included *Myopotamus coypus* as a Peruvian animal in his 'Mammalium Conspectus' (Arch. f. Naturg. x. 1, p. 252), but afterwards withdrew it as unauthenticated ('Fauna Peruana,' p. 184).

§ *Cf. suprà*, p. 3, footnote.

‖ The laws of nomenclature requiring that one of Cuvier's names should be retained for this genus, which Brandt had shown to be indivisible, I formerly preferred to use his second title, in an amended form, and called the subfamily Sphingurinæ (P. Z. S. 1876, p. 93). But Mr. J. A. Allen has since pointed out (Mon. N.-Am. Rodent. p. 385) that Gervais had already founded the group on *Synetheres* (Zool. et Paléont. Franç. p. 18); and it is evident that his example should be followed to prevent confusion.

1. Synetheres mexicanus.

Hystrix mexicana, Kerr, Linn. An. Kingd. p. 214 (1792, ex Pennant)[1]*.
Cercolabes liebmani, Reinhardt, Arch. f. Naturg. x. 1, p. 241 (1844, descr. orig.)[2].
Cercolabes novæ-hispaniæ, Waterhouse, Nat. Hist. Mamm. ii. p. 422 (1848, ex Brisson †)[3]; Tomes, P. Z. S. 1861, p. 288[4]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 272[5].
Hoitztlocuatzin seu *Tlacuatzin spinosus*, Hernandez, Rer. Med. Nov. Hisp. p. 322.

Hab. Mexico (*Mus. Brit.*), Mirador, San Francisco Tenampa (*Liebmann, Mus. Hafn.*[2]), Yucatan (*Gaumer, Mus. Boucard*); Guatemala, Dueñas (*Salvin, Mus. Brit.*[4]); Costa Rica, Irazú, Volcan de Barba (*Frantzius*[5]).

The Mexican Porcupine was described two centuries ago by Hernandez under the euphonious title which it still bears in its native land, and received systematic names from Brisson and Kerr. It was long confused, however, with the common Brazilian species, *S. prehensilis* (Linnæus); and consequently Professor Reinhardt, to whom we are indebted for the first scientific description, thought it best to rename it. As there can be no doubt, however, from the references to Hernandez, as to the identity of the species, Kerr's name must of course be preserved.

Professor Reinhardt's specimens were obtained at Mirador and San Francisco, in the State of Vera Cruz, by the late Professor Liebmann, who stated that the species was generally distributed in the eastern parts of Mexico in the temperate hill-region between the 22nd and 16th parallels of north latitude[2]. In Guatemala Mr. Salvin obtained it at Dueñas[4]; but it is far from common in that country. In Costa Rica also the Porcupine appears to be rare; during his lengthened residence in the country Dr. v. Frantzius only saw six examples, which were obtained in the high-lying woods of the Irazú and on the Volcan de Barba[5].

In his quaint account of the animals of Campeachy, Dampier dismisses this species with the remark:—"The *Porcupine* being a Creature well known, I'll pass it in silence." Unfortunately subsequent travellers have treated the Mexican species in a similar way, and nothing appears to have been recorded of its habits. In these, however, it probably differs little from its southern congeners, which have been well described by Azara, Rengger, Prince Maximilian, and others.

* The authority usually quoted for *mexicana* is Shaw's 'General Zoology,' ii. p. 8 (1801); but Mr. O. Thomas has pointed out that it was used as above by Kerr nine years previously. *Cf.* Ann. & Mag. Nat. Hist. 5th ser. iv. p. 397.

† According to the British-Association code, Brisson's *specific* names cannot be used, although his genera are recognized when they are additional to those of Linnæus.

Fam. VI. DASYPROCTIDÆ.

1. DASYPROCTA.

Agouti, Lacépède, Mém. de l'Inst. Nat. iii. p. 424 (1801)*.
Dasyprocta, Illiger, Prod. Syst. Mamm. &c. p. 93 (1811).
Cloromis [sic], Fréd. Cuvier, Ann. du Mus. xix. p. 290 (1812).

Both the known genera of the exclusively Neotropical family Dasyproctidæ are represented in Central America, the present by at least three species. The genus *Dasyprocta* is characterized by a compact body, long limbs, three-toed hind feet, and a very short or even rudimentary tail: the skull is elongated and smooth, with no separate canal in the infraorbital opening, and no cavity in the malars; the paroccipital processes are short; and the molars are very simple.

Many species of Agouti, all very closely allied, have been described from various parts of the Neotropical Region. In revising the group four years ago† I recognized eight or nine geographical races as deserving of specific distinction; and this still appears to me to represent the present state of our knowledge, although it is not improbable that future investigation may prove that some of these forms grade into one another. The three Central-American races are all peculiar to the subregion, and differ from one another in the following points:—

1. *D. isthmica.* Fur ringed with black and yellow; long hairs of rump not annulated, black with broad orange or yellow tips. Length of head and body about 22″, of hind foot 4″·25.
2. *D. punctata.* Fur ringed with black and bright rufous or yellow, that of throat and breast uniform with the back; hairs of rump annulated to their base. Length about 22″, of hind foot 4″.
3. *D. mexicana.* Fur ringed with black and pure white, long hairs of rump not annulated, black throughout their length. Length about 17″, of hind foot 3″·50.

Besides these the Zoological Society has received from Colon living specimens of *D. variegata*, Tschudi, a Peruvian and Colombian form, easily distinguishable by its black fur being ringed with pale yellow *only* near the tip. The exact locality whence these animals were obtained, however, is uncertain.

1. **Dasyprocta isthmica.** (Tab. XVIII. figg. 2, 3.)

Dasyprocta cristata, Waterhouse, Nat. Hist. Mamm. ii. p. 384[1]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 274 (nec Ét. Geoffroy)[2].
Dasyprocta punctata, Sclater, P. Z. S. 1874, p. 665 (nec Gray)[3].
Dasyprocta isthmica, Alston, P. Z. S. 1876, p. 347 (descr. orig.)[4].

Hab. Costa Rica (*Hoffmann & Frantzius, Mus. Berol.*[2]); Panama (*Brit. Mus.*; *Viv. Zool. Soc.*[4]).

* *Cf. suprà*, p. 3, footnote.

† "On the Genus *Dasyprocta*," P. Z. S. 1876, pp. 347–352, pl. xxix.

The Isthmian Agouti, as is shown by the above synonymy, has been referred to various species by different writers; but it is a sufficiently well-marked form, distinguishable at a glance from its congeners by the colour of the long hairs of the rump, which are not annulated, but black broadly tipped with orange or yellow. Nearly a dozen examples which I have examined agree in all essential points, differing only slightly in the more or less ruddy tint of the rump; and Dr. v. Frantzius says that the specimens obtained by him in Costa Rica were also very uniform in coloration.

Mr. Salvin tells me that this appears to be a common species in Panama. In 1873 he saw some running about in the underwood of the forest near Obispo station. Dr. v. Frantzius remarks that its habits do not differ from those of the other Agoutis[2].

This is doubtless the animal which Lionel Wafer met with in Panama in 1681, and of which he gives the following account:—"Here are *Rabbits*, call'd by our *English*, *Indian* Conies. They are as large as our Hares; But I know not that this Country has any Hares. These Rabbits have no Tails, and but little short Ears; and the Claws of their Feet are long. They lodge in the Roots of Trees, making no Burrows; and the *Indians* hunt them, but there is no great Plenty of them. They are very good Meat, and eat rather moister than ours"*.

Our illustration is from one of the type specimens now in the British Museum.

2. **Dasyprocta punctata.**

Dasyprocta punctata, Gray, Ann. Nat. Hist. x. p. 264 (1842, descr. orig.[1]); Zool. Voy. 'Sulphur,' p. 36, pl. xv.[2]; Alston, P. Z. S. 1876, p. 350[3].
? *Dasyprocta aguti*, Tomes, P. Z. S. 1861, p. 281 [nec Linnæus][4].
Dasyprocta azaræ, Tomes, P. Z. S. 1861, p. 287 [nec Lichtenstein][5].
Cotusa of Guatemalans.

Hab. Mexico, Yucatan (*Gaumer*, *Mus. Boucard*); Guatemala, Dueñas (*Salvin*, *Mus. Brit.*[5]); Costa Rica (*Viv. Zool. Soc.*[3]).

The Punctated Agouti is much less constant in colour than the last species, Mr. Salvin's Guatemalan specimens varying in general tint from a rich deep chestnut to a pale yellow. The latter agree exactly with Gray's types, of which the vague habitat "Tropical America" only is given, but which were collected by Commanders Belcher and Kellett, probably on the west coast of Costa Rica or Nicaragua.

These pale specimens bear a very remarkable resemblance to *D. azaræ*, Lichtenstein, the most southern species of Agouti, which inhabits central and southern Brazil, Paraguay, and Bolivia. Consequently *D. punctata* has been united with *D. azaræ* by Wagner† and by Mr. Waterhouse‡; and were it not for the consideration of the vast

* Dampier's Voyages, iii. p. 330.
‡ Nat. Hist. Mamm. ii. p. 387.
† Suppl. Schreb. Säugth. iv. p. 40.

gap between their ranges, I should probably have followed their example. Even the palest individuals of the present species, however, may be separated from the Brazilian form by their larger size, their still more uniform coloration, and by the hair of the throat, breast, and lower parts being annulated like that of the rest of the body; while I have never seen an individual of *D. azaræ* which showed a trace of the rich ruddy tints which appear to be normal in the northern race.

The range of this Agouti is intermediate between that of the last species and the next, both of which it probably overlaps. M. Boucard has shown me specimens from Yucatan; it is common in most parts of Guatemala; and presumably it is found in Nicaragua, for the Zoological Society have received examples from Costa Rica, where the species appears to have escaped the observation of Dr. v. Frantzius.

Messrs. Godman and Salvin inform me that in Guatemala "the natives hunt these Agoutis in the forest with dogs. They are usually run into holes in the ground, or amongst rocks, whence they are often started again by being smoked out. The flesh of the *Cotusa* is much esteemed there, being white and tender; but to our mind it is rather too rich to be altogether palatable."

3. **Dasyprocta mexicana.** (Tab. XVIII. fig. 1.)

Dasyprocta mexicana, de Saussure, Rev. et Mag. Zool. 1860, p. 53 (descr. orig.)[1]; Sclater, P. Z. S. 1874, p. 683[2]; Alston, op. cit. 1876, p. 349[3].

Hab. Mexico (*de Saussure*[1]; *Lichtabbel, Viv. Zool. Soc.*[2]; *Liebmann, Mus. Hafn.*).

The Mexican Agouti, the most northern and one of the smallest of the members of the genus, has a considerable general resemblance to *D. fuliginosa*, Wagler, of Northern Brazil and Peru, but may be recognized, apart from the great difference in size, by the short and uniformly black hair of the rump.

M. de Saussure, who has given a very detailed description of the species, adds the following details as to its habits:—"This charming little animal inhabits the hot zone of Mexico. Its flesh is excellent, and it is hunted as Hares are with us; but it is much more difficult to catch, on account of its great agility, and of the prodigious bounds by which it surmounts any obstacle. For the rest, its disposition is very gentle. Taken young it is easily tamed, and is so cleanly that it may be allowed to run loose about the house. I brought one alive with me to Europe; but when alarmed by the entrance of a stranger it made such enormous bounds, sweeping the tables and upsetting the furniture, that I was obliged to get rid of it. I presented it to the Menagerie of the Museum, where it died soon after"[1].

Our illustration is from a specimen which was presented to the Zoological Society in 1874 by Mr. H. A. Marckmann de Lichtabbel, the skin of which is now preserved in the British Museum.

2. CŒLOGENYS.

Cœlogenus, Fréd. Cuvier, Ann. du Mus. x. p. 203 (1807).
Cœlogenys, Illiger, Prod. Syst. Mamm. &c. p. 92 (1811).

Hardly any genus of Rodents presents more remarkable peculiarities than *Cœlogenys*, which nevertheless agrees closely with *Dasyprocta* in general structure. Externally the most striking characters are the reflection of the skin of the cheeks beneath the zygomata and the presence of five toes on the hind feet. In the skull the zygomata are enormously inflated, the anterior two thirds being composed of the maxillary zygomatic process, which is hollowed out below into a great chamber, lined with mucous membrane and communicating with the mouth. The use of this very curious structure has never been satisfactorily explained.

Only one widely distributed species of this genus is known to exist; for the dark- and light-coloured animals on which Frédéric Cuvier founded his *Cœlogenus subniger* and *C. fulvus* have long since been proved to be mere varieties, and have even been found paired together*. The colour of the Paca may therefore be said to vary from pale red-brown to dark sooty-brown, marked with numerous white spots; it attains a length of about twenty-four inches.

1. Cœlogenys paca.

Mus paca, Linnæus, Syst. Nat. i. p. 81 (1766, ex Marcgrave)[1].
Cœlogenus subniger, Fréd. Cuvier, Ann. du Mus. x. p. 206 (1807, descr. orig.)[2]; Dugès, La Nat. i. p. 138[3].
Cœlogenys paca, Tomes, P. Z. S. 1861, p. 288[4]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 273[5].
Tepescuinte, Tepescuintle of Guatemalans and Costa-Ricans.

Hab. Mexico, Vera Cruz (*Dugès*[3]); Guatemala, Coban, Dueñas[4], Rio Chisoy (*Godman & Salvin, Mus. Brit.*); Costa Rica (*Frantzius*[5]); Panama (*Viv. Zool. Soc.*).—South America to Paraguay.

This widely-spread Neotropical species is found throughout the hotter parts of Central America. The Zoological Society have received several living specimens from Panama; and in Costa Rica Dr. v. Frantzius says that it inhabits the warmer and low-lying parts of the mountain-ranges, where it lives in burrows near the rivers. Its flesh is much prized by the Costa-Ricans, to whom it is known by the Mexican name of *Tepescuintle*—literally mountain-dog. The *Tepeytzcuitli* of Hernandez, however, appears to have been a beast of prey †, from which the name has somehow been transferred to the Paca[5].

* *Cf.* Rengger, Säugeth. v. Paraguay, p. 252.
† De Quadr. Nov. Hisp. fol. 7, cap. xxi.

In Guatemala Messrs. Godman and Salvin tell me that the *Tepescuinte* is "a common species in the neighbourhood of Coban, where it gives good sport to the native hunters, who keep dogs for their pursuit—curs, it is true, of every shape, colour, and size, but valued by their owners for their powers of scent, their perseverance, and their sagacity. A *Tepescuinte*, when found, is either run by the dogs within shot of the hunter, or to ground, whence it is smoked out and either killed or started on a fresh run. Traps are often set in the forest for them, formed like a hole, the upper part being a heavy log weighted with stones, and kept up by some slight contrivance easily brushed away by the animal in its hurry to escape from the dogs. In the valley of the Rio Negro, or Chisoy, *Cœlogenys paca* is apparently very abundant; for in an Indian rancho on the banks of the river, on the road below San Cristobal, we found dozens of their singular skulls strung about the walls of the hut".

Passing further to the northward, we find that Vera Cruz is given by Dr. Dugès as a locality for the Paca[3], this being the only record, so far as I am aware, of its existence in Mexico.

Suborder II. DUPLICIDENTATA.

The small but well-marked suborder of the double-toothed Rodents consists of only two families, the Lagomyidæ and the Leporidæ. Both are found in the Nearctic Region; but only the latter is represented, and that very poorly, in South America. As will be seen presently, several species of Hare are found in the northern portion of our subregion, but only two go so far south as Costa Rica.

Fam. I. LEPORIDÆ.

1. LEPUS.

Lepus, Linnæus, Syst. Nat. i. p. 77 (1766).

The Hares form a very natural family, too clearly defined and well known to require to be characterized, and too homogeneous to be broken up into separate genera. They are principally represented in our fauna by Nearctic types. Of nine well-ascertained North-American species, *four* range well into Central America, a *fifth* species appears to be peculiar to the subregion, and a *sixth* is also found in Colombia. With the exception of a closely allied Brazilian form, the latter is the only Hare yet discovered on the South-American continent.

Mr. J. A. Allen's recent reviews of the North-American Leporidæ* have been based

* Proc. Boston Soc. Nat. Hist. xvii. pp. 430–436 (1875); Mon. N.-Am. Rodent. pp. 265–378 (1877).

on a much richer material than had been available to any previous writer. Following his arrangement, the six Central-American species may be thus characterized:—

1. *L. sylvaticus.* Above pale yellowish brown, varied with black, and tinged with rufous; beneath white. Length about 14″, of ear 2″·50, of tail 1″·75.
2. *L. graysoni.* Above pale rufous, varied with blackish brown; beneath white; tail short, blackish brown above, white below. Length about 14″·50, of ear 2″·30, of tail 1″.
3. *L. gabbi.* Above cinnamon-brown, strongly varied with black; beneath white; ears very short; tail rudimentary, covered with yellowish-brown hairs. Length about 14″, of ear 1″·50.
4. *L. callotis.* Above pale yellowish brown, mixed with black; beneath greyish white; ears longer than the head, sometimes tipped with black; tail black above (which colour extends into a patch on the rump), grey below. Length about 20″, of ear 5″, of tail 2″·25.
5. *L. palustris.* Above rufous, strongly shaded with black; beneath greyish white; tail short, rufous, varied with black above, greyish white below; ears broad and rounded; feet sparsely furred. Length about 16″, of ear 2″·50, of tail 0″·80.
6. *L. aquaticus.* Above yellowish brown, finely shaded with black; beneath pure white; tail moderate, dark brown or dusky above, pure white below; ears and feet as in last species. Length about 19″, of ear 2″·75, of tail 1″·90.

The last two species agree, not only in their scantily-haired feet and semiaquatic habits, but in the comparative stoutness of their skulls and incisor teeth, and in having the postorbital process completely ankylosed with the cranium. They were generically separated by the late Dr. Gray, under the name of *Hydrolagus**.

1. Lepus sylvaticus.

? *Lepus nanus*, Schreber, Säugth. 4ter Th. p. 881, pl. ccxxxiv. B. (1792, in part)[1].
Lepus sylvaticus, Bachman, J. Ac. Philad. vii. p. 403 (1837, descr. orig.)[2]; Baird, Mamm. N. Am. p. 597[3]; Dugès, La Nat. i. p. 138[4]; Allen, Mon. N.-Am. Rodent. p. 327[5].
Conejo of Mexicans (common to the other species).

Hab. North America, south of 45° N. lat.[5]—Mexico, Guanajuato (*Dugès*[4]), Tehuantepec (*Sumichrast, U.S. Nat. Mus.*[5]), Orizaba (*Botteri, ib.*[5]), Mirador (*Sartorius, ib.*[5]), Merida (*Schott, ib.*[5])

This is the well-known "Grey Rabbit" or Wood-Hare of the United States, where it

* Ann. & Mag. Nat. Hist. 3rd ser. xx. p. 221.

is the commonest species of the genus in the Atlantic States. Mr. Allen has well described the variations in size and coloration which occur in different parts of its extensive range, and which have led to the description of several nominal species, as *Lepus bachmani*, Waterhouse, *L. nuttalli*, Bachman, *L. artemisia*, Bachman, and *L. auduboni*, Baird. Of these, three seem to represent distinct geographical races; for *L. nuttalli* of the central tracts from Oregon southwards is paler and smaller than the true *L. sylvaticus* of the Atlantic sea-board; *L. arizonæ* of the deserts of Arizona is still paler and has longer ears; and *L. auduboni* of the Pacific slopes is darker than the typical form. They all, however, blend one with another, and cannot be regarded as more than varieties of one widespread and somewhat variable species[5].

According to Audubon and Bachman, the Wood-Hare is one of the most prolific of its family, breeding throughout the greater part of the year, and producing five to seven young ones at a time. It runs with great fleetness when first started, but, if pursued, soon seeks for shelter in a hole among the roots of a tree or in a hollow log*.

South Mexico and Yucatan form the southernmost extreme of the range of this species, as at present known. Mr. Allen observes that specimens from those countries have the rufous tinge of the fur strongly developed, especially on the legs and feet, but adds that specimens from Tehuantepec and Orizaba can be almost exactly matched by others from the neighbourhood of Washington.

2. **Lepus graysoni.**

Lepus graysoni, Allen, Mon. N.-Am. Rodent. p. 347 (1877, descr. orig.[1]).

Hab. Mexico, Tres Marias Islands (*Grayson*, *U.S. Nat. Mus.*[1]); Costa Rica, Talamanca (*Carmiol*, *ib.*[1]).

This species has been lately described by Mr. Allen from two specimens in the National Museum at Washington—one brought from the Tres Marias Islands by the late Colonel A. J. Grayson, in whose honour the specific name is bestowed, the other obtained by Carmiol in Costa Rica. Mr. Allen says of the Tres-Marias example that "it is about the size of *Lepus sylvaticus*, but differs in many important features from any of the varieties of the *L. sylvaticus* group. The form of the postorbital processes shows that in this respect its affinities are with this group rather than with the Aquatic Hares (*L. palustris* and *L. aquaticus*), although its feet are small and as sparsely haired as in *L. palustris*. In general colour and in some other features it somewhat resembles *L. brasiliensis*, but is in other respects quite different. It has a tail as short as *L. trowbridgei*." The Costa-Rican specimen agrees in all essential particulars, but is somewhat paler-coloured[1].

Knowing this Hare only from the original description, I can express no opinion as to its specific distinctness from *L. sylvaticus*.

* Quadr. N. Am. i. p. 173.

Pl. 8

3. **Lepus gabbi.** (Tab. XIX.)

Lepus brasiliensis, Frantzius, Arch. f. Naturg. xxxv. 1, p. 276 (nec Linnæus)[1].
Lepus brasiliensis, var. *gabbi*, Allen, Mon. N.-Am. Rodent. p. 349 (1877, descr. orig.)[2].

Hab. Costa Rica (*Frantzius*[1]; *Hoffmann*, *Mus. Berol.*), Talamanca (*Gabb*, *U.S. Nat. Mus.*[2]); Panama, Chiriqui (*Hicks*, *ib.*[2]).—South America, Colombia.

Mr. Allen described the Costa-Rican Hare as a variety of *Lepus brasiliensis*, to which species it had already been referred by Dr. v. Frantzius, but observed that its characters were so striking that he was at first inclined to regard them as of specific value[2]. In default of any evidence of intergradation, I feel compelled to take the latter view, and to raise Mr. Allen's "subspecific designation" of *gabbi* to full value. Leaving coloration out of the question, the Central-American Hare differs from the Brazilian in its much shorter ears (1″·50 as compared with 2″) and in the rudimentary condition of its tail. In *L. brasiliensis* that organ is very short, and almost concealed in the fur of the rump, but it is distinctly developed even in very young leverets. In *L. gabbi*, on the other hand, as far as can be judged from dried skins, the tail appears to be represented by a mere tubercle, covered with yellowish-brown fur.

Specimens in the British Museum of *L. gabbi* from Concordia in Colombia, and of true *L. brasiliensis* from the Rio Napo in Ecuador, do not show any trace of intergradation in these characters; and until such evidence is adduced it appears to me that *L. gabbi* must be regarded as a distinct and even well-marked species.

In Costa Rica Dr. v. Frantzius says that this Hare frequents forest-glades which are partially overgrown with brushwood. During the day it remains concealed amongst the herbage; and as woodcraft is little understood in Costa Rica, it is seldom shot. The young, however, which are easily surprised, are often taken alive[1].

Our figure is taken from one of the Colombian specimens in the British Museum.

4. **Lepus callotis.**

Lepus callotis, Wagler, Nat. Syst. Amph. &c. p. 25 (1830, descr. orig.)[1]; Baird, Mamm. N. Am. p. 590[2]; de Saussure, Rev. et Mag. de Zool. 1860, p. 56[3]; Dugès, La Nat. i. p. 138[4]; Allen, Mon. N.-Am. Rodent. p. 350[5].
Lepus mexicanus, Lichtenstein, apud Richardson, Rep. Brit. Assoc. 1836, p. 150[6].
Lepus texianus, Audubon & Bachman, Quad. N. Am. iii. p. 156, p. cxxxiii (1853, descr. orig.)[7].
Eliztactochtli, Hernandez, De Quad. Nov. Hisp. fol. 2, cap. iv.
Liebre of Mexicans[4].

Hab. North America, central regions from Oregon southwards[5].—Mexico (*Deppe*, *Mus. Berol.*), Michoacan (*de Saussure*[3]), Guanajuato, Guadalajara (*Dugès*[4]), Orizaba, Tehuantepec (*Sumichrast*, *U.S. Nat. Mus.*[5]).

The "Jackass Hare" is a well-known animal on the central prairies of the United States, and, according to Dr. Dugès, it is the "Liebre" *par excellence* of the Mexicans.

In the limits of its rather extensive range it presents a considerable variation in colour, the more northern race, the "var. *texianus*" of Mr. Allen, having the ears broadly tipped with black; whereas in the typical or southern form, "var. *callotis*," they are almost or quite free from black, which is replaced by yellowish or pure white. Mr. Allen has shown, however, that this character is quite variable; and I may add that black ear-tips are present in one Mexican specimen in the Berlin Museum, though totally absent in a second. Besides the difference in the ears, southern specimens may usually be recognized by their stronger and more rufous coloration.

The best account of the habits of the Jackass Hare with which I am acquainted is that given by Dr. Elliott Coues in the first volume of the 'American Naturalist.' Resembling other Hares in its general manners, it is remarkable for its activity; "it has a long swinging gallop, and performs prodigious leaps, some of them over bushes four feet high—now in the air, its feet all drawn together and down-stretched—now on the ground, which it touches and rebounds from with marvellous elasticity." It does not burrow, but constructs a "form" in some convenient bush, and apparently breeds only in summer, producing as many as six young ones at a birth*.

Hitherto the range of *L. callotis* has not been traced further south than the State of Tehuantepec.

5. **Lepus palustris.**

Lepus palustris, Bachman, J. Ac. Philad. vii. p. 194, pls. xv., xvi. (1837, descr. orig.)[1]; Baird, Mamm. N. Am. p. 615[2]; Tomes, P. Z. S. 1861, p. 281[3]; Allen, Mon. N.-Am. Rodent. p. 360[4].
Conejo of Guatemalans.

Hab. North America, eastern slopes from North Carolina southward[4].—Mexico, Mirador (*Sartorius, U.S. Nat. Mus.*[4]); Guatemala, Dueñas (*Salvin, Mus. Brit.*[3]), San Gerónimo and Coban (*Sarg*).

The Marsh-Hare inhabits the low-lying sea-board of the Atlantic Ocean and Gulf of Mexico, from the swamps of North Carolina to Guatemala. Being gifted with but a slight portion of the proverbial swiftness of its family, it seeks for protection among the thick and tangled brushwood which borders its favourite marshes, taking to the water freely when pursued, and even, it is said, swimming from point to point of its own accord. Dr. Coues, however, who has carefully observed the manners of the Marsh-Hare in North Carolina†, thinks that its aquatic habits have been much exaggerated by some writers, and that it only takes to the water in cases of emergency.

In Guatemala, also, Messrs. Godman and Salvin did not observe the *Conejo* to be especially water-haunting in its habits. They tell me, "When cochineal was cultivated at Dueñas we used often to find this Hare between the rows of cactus-plants, where it came to feed on the vegetation which grows in the cleaned ground with such marvellous rapidity in the rainy season. During the months of July, August, and

* Amer. Naturalist, i. pp. 531–534. † Proc. Boston Soc. Nat. Hist. xiii. pp. 86–93.

September we seldom failed to secure one during an evening's stroll with a gun. Though rather shy, they seldom ran far when surprised. In the woods they are not often seen, though we found them in the opening in the forest of the Volcan de Fuego known as Pajal Grande. Here they would lie out like Rabbits in any clump of bushes. The flesh of this Hare is excellent, and both in colour and taste something between that of a Hare and a Rabbit. They do not, so far as we know, burrow in the ground. In San Gerónimo and Coban this animal is equally abundant, according to Mr. Sarg, plantations being their chief place of resort." In the United States, Audubon and Bachman state that the young, six or seven in number, are deposited in a rather large nest, often composed of a species of *Juncus* cut into lengths, and generally domed over, with an entrance at one side*.

Mr. Allen finds that the variation in colouring of this species is confined to the intensity of the tints. Of the series which he examined, "by far the most highly-coloured specimen is one from Mirador (near Vera Cruz), Mexico, in which the black [of the upper parts] is considerably more prevalent than in average specimens from the Atlantic States. The greyish area below is also more restricted and more suffused with brownish"[4]. The same remarks apply to an example contained in Mr. Salvin's Guatemalan collections in the British Museum.

6. **Lepus aquaticus.**

Lepus aquaticus, Bachman, J. Ac. Philad. vii. p. 119, pl. xxii. fig. 2 (1837, descr. orig.[1]); Baird, Mamm. N. Am. p. 612[2]; Allen, Mon. N.-Am. Rodent. p. 364[3].

Hab. North America, from Alabama westward and southward[3].—Mexico, Orizaba (*Sumichrast*, *Botteri*, *U.S. Nat. Mus.*[3]), Sierra Madre (*Xantus*, *ib.*[3]); Yucatan, Merida (*Schott*, *ib.*[3]).

Like the last species, the Water-Hare or Swamp-Hare was first described by Bachman; and he and Audubon have given the fullest account of its habits. According to them it is a still more aquatic animal than *L. palustris*, prefering "low and marshy places, or the neighbourhood of streams and ponds of water, to which it is fond of resorting. It swims with great facility from one little islet to another, and is generally found seeking its food in wet places or near the water, as it subsists on the roots of various kinds of aquatic plants, especially on a species of *Iris* growing in the water." It is much fleeter of foot than the Marsh-Hare, but when pursued it almost invariably directs its course to the nearest pool or river. The young are said to be "frequently found in nests formed of leaves and grasses, placed in hillocks in the swamps, or in the hollow of some fallen tree"†. Dr. Lincecum observes that in sugar-growing countries this Hare lives principally on the leaves of the canes, but that in Texas it feeds on various grasses and wild herbage‡.

The Water-Hare is abundant in most swampy parts of the southern United States

* Quadr. N. Am. i. p. 155. † Tom. cit. p. 289. ‡ Amer. Naturalist, vi. p. 771.

westward and southward of Alabama. Thence it appears to extend along the east coast as far as Orizaba and Yucatan, whence there are many specimens in the National Museum at Washington. Mr. Allen says that these last differ in no marked degree from examples collected in Mississippi and Louisiana; so the species cannot be considered very variable in its characters.

Order VIII. EDENTATA.

Suborder I. TARDIGRADA.

The group of so-called Edentate Mammals is made up of such widely distinct and dissimilar forms that their natural arrangement is a very difficult undertaking. I am myself by no means convinced that any of the proposed classifications are satisfactory; but in the meantime I will follow that most generally adopted, and recognize two suborders, the Tardigrada of Illiger and the Entomophaga of Wagner. Of these the first contains only one recent family, eminently characteristic of the Neotropical fauna.

Fam. I. BRADYPODIDÆ.

1. BRADYPUS.

Bradypus, Linnæus, Syst. Nat. i. p. 50 (1766).

Amongst the strangest of the many strange Edentate types are the Sloths, constituting the family Bradypodidæ, and well represented in Central America by both the known genera. Of these the Three-toed Sloths, forming the restricted genus *Bradypus**, may be at once distinguished by the structure of their fore feet, in which the *three* middle fingers are well developed and powerfully armed with long hooked claws. In their osteology they present the very exceptional peculiarity of possessing *nine* cervical vertebræ; their skulls are high and narrow, with merely rudimentary intermaxillaries; and the anterior pair of molars are not larger than the rest.

A considerable number of species of Three-toed Sloths have been described; but much uncertainty still exists as to their claims to distinction. A large series of specimens with carefully authenticated localities is wanted before a definite conclusion can be come to on many points; but the material already available seems to me to show that many of the supposed species, especially those of the late Dr. Gray, have been

* Gray confined the name *Bradypus* to the Brazilian Collared Sloth, *B. torquatus,* Illiger; while he named all the other three-toed species *Arctopithecus* (P. Z. S. 1849, p. 65). It is evident, however, that *B. tridactylus* must be regarded as the type of *Bradypus*, as instituted by Linnæus and restricted by Illiger. If *B. torquatus* is considered to deserve generic distinction, it must stand as *Scœopus* of Peters (Monatsb. Ak. Berl. 1864, p. 678, footnote).

founded on individual variations. Thus Gray laid great weight on certain cranial characters, especially on the form of the angle of the mandible, which he found to be deep and truncated in some specimens, and slender and produced in others*. This he regarded as a constant character of specific value, observing that he had never seen any lower jaws which seemed to him to pass by intermediate gradations from one of these forms to another. A comparison of Gray's types and of other specimens leads me to a very different conclusion. As was well remarked by the late Mr. H. J. Turner, "the skulls of the Three-toed Sloths vary greatly, and all present a coarse, rough-hewn appearance which must detract from our confidence in little differences in detail"†. The form of the mandibular angle, instead of being constant, differs in almost every specimen examined; and the lower jaws of the types of Gray's *Arctopithecus marmoratus*, *A. boliviensis*, *A. problematicus*, and *A. blainvillei* appear to me to form an intergrading series in which it is impossible to find any tangible characters.

In 1871 Gray described two new species of Sloths from Central America, under the names of *Arctopithecus castaneiceps* and *A. griseus*. The former is still only known by the type specimen, not in very good condition, in the British Museum; and I am led provisionally to accept its specific distinction on account of the peculiar character of the hair of its face, which rather resembles that of the very distinct *Bradypus torquatus* than that of any of the more nearly allied forms. As far as can be judged from the stuffed skin, the facial fur of *B. castaneiceps* is nowhere fine and closely lying as in *B. tridactylus* and its allies, or erect and velvety as in *B. cuculliger*, but is crisp and recurved like that of the remainder of the body. In the skull the mandibular angle is considerably produced.

Arctopithecus griseus, on the other hand, I cannot distinguish from the well-known *Bradypus infuscatus* of Wagler, if, indeed, the latter is any thing more than a northern race of *B. tridactylus*‡. Thus I would provisionally recognize two species of Central-American Three-toed Sloths, which may be thus characterized:—

1. *B. infuscatus.* Fur of face fine, silky, and close-lying. Colour grey, varying in depth, and more or less mottled with white. Saddle-mark of male orange, mottled with black. Length of head and body eighteen to twenty inches.
2. *B. castaneiceps.* Fur of face crisp, coarse, and recurved, like that of the rest of the body. Colour grey, strongly tinged with rufous about the head. Saddle-mark orange, mottled with black. Length about eighteen inches.

* P. Z. S. 1849, pp. 65–73, pls. Mamm. x. & xi.; P. Z. S. 1871, pp. 428–449, pls. xxxv.–xxxvii.

† P. Z. S. 1851, p. 209.

‡ On this point I have not the materials for any certain conclusion. I may observe, however, that the only *constant* difference which I have been able to find between the two forms is that the saddle-mark of the male is black and white in *B. tridactylus*, and black and orange in *B. infuscatus*. All the other characters which have been described appear to be variable; and I may further remark that of two specimens from Pará in the Berlin Museum one has the saddle-mark very pale, while it is deep orange in the other.

Before proceeding to the consideration of these species, something may here be said as to a remarkable peculiarity which may often be observed in both the Three-toed and Two-toed Sloths. This is the curious green shade with which their brownish or greyish fur is often tinged, especially on the back and nape—a colour which has nothing in common with the metallic gloss which is so striking in some of the Insectivores, being a distinct greyish green, not unlike that of the foliage of the olive-tree. This colour, as Dr. Seemann observes*, fades considerably in dried skins; and it is also observed to diminish rapidly in brilliancy in individuals which are kept in captivity in Europe. My friend Mr. H. C. Sorby has at my request investigated this interesting phenomenon both with the microscope and spectroscope; and he finds that it is caused by the presence of multitudes of small green algæ, very similar to the common *Chlorococcum*, which are found on the surface of the hairs in every stage of development. In *Bradypus*, Mr. Sorby tells me, the algæ are generally spread over the loose pith-like outer surface of the hairs, while in *Cholopus* they are confined to the deep depressions which separate the clean solid ribs by which each hair is fluted. Mr. Sorby's observations, I trust, will soon be communicated in full to the Linnean Society; and I would here merely draw attention to a very curious fact in mimicry, namely that in this case a vegetable parasite is of direct benefit to its animal host. Various travellers have remarked on the protection afforded to the Sloths by their greenish coloration, which harmonizes so well with the foliage of their native forests; and we now find that it is due, not to any peculiarity of the animal's organization, but to the direct assistance of the parasitic *Chlorococcum*.

1. Bradypus infuscatus.

Bradypus infuscatus, Wagler, Isis, 1831, p. 611 (descr. orig.)[1].

Arctopithecus griseus, Gray, P. Z. S. 1871, p. 446, pl. xxxvi. (descr. orig.)[2]; Hand-list Edent. &c. Mamm. p. 5[3].

Hab. Panama (*Mus. Paris*), Cordillera del Chucu, Veragua (*Arcé*, *Mus. Brit.*[2]).—South America to Peru and Brazil [1].

As already observed, I am unable to recognize Gray's *Arctopithecus griseus* as a distinct species. The colour of the fur of the type specimens is pale, but not more so than that of some South-American examples; and no trust can be placed in the form of the mandibular angle, which, moreover, is evidently imperfectly ossified in the young skull described and figured by Gray.

Bradypus infuscatus was first described by Wagler from a specimen brought home by Spix, and appears to replace *B. tridactylus* (if it is really distinct) in the north-western regions of South America. It has been found in Northern Brazil, Bolivia, Peru, and Ecuador, whence its range doubtless extends through Colombia to the State of Panama; for the British-Museum specimens ascribed to "Costa Rica" by Gray are

* *Infrà*, p. 184.

not from that country, but were obtained in Panama by Enrique Arcé, who was employed for several years by Messrs. Godman and Salvin as a collector in the Southern States of Central America.

2. **Bradypus castaneiceps.**

Arctopithecus castaneiceps, Gray, P. Z. S. 1871, p. 444, pl. xxxv. (descr. orig.)[1] ; Hand-list Edent. &c. Mamm. p. 5[2].

Camaleon of Nicaraguans[1].

Hab. NICARAGUA, Chontales (*Seemann, Mus. Brit.*[1]).

I have already given my reasons for provisionally accepting this species, which still rests on the single specimen in the British Museum. This was received in 1871 from the well-known botanist the late Dr. Berthold Seemann, who gave the following account of it in a letter to Dr. Gray :—

"The Sloth (*Arctopithecus*) I brought home was caught in the woods surrounding the Javali gold-mine in the Chontales district of Nicaragua, about 2000 feet above the sea-level, a country having nine months of rain during the year. The natives call this animal 'Camaleon,' and say that it is very rare, which may be the case, as during all my travels in the country I have never met with it before. But, on the other hand, it should be borne in mind that it has almost exactly the same greyish-green colour as *Tillandsia usneoides*, the so-called 'vegetable horsehair,' common in the district; and if it could be shown that it frequented trees covered with that plant (a point I hope to ascertain during my next visit in June next), there would be a curious case of mimicry between this Sloth's hair and the *Tillandsia*, and a good reason why so few of these Sloths are seen. When the animal first came into my possession it was much *greener* than its preserved skin is now, which has been dried over the fire, and it remains to be seen whether the greenness is owing, at least in part, to the fact that the hair becomes covered with minute cryptogamic organisms, the damp climate and thick gloomy forests being favourable to their growth. I had no microscope with me to clear up this point; but this you will, of course, easily ascertain*. I had the animal alive for about a month, feeding it on the young leaves of *Cecropia peltata*, an urticaceous fast-growing tree of the district; and it used to eat most during the night, when it was also most lively. One night it escaped from its prison, and next morning was found about eight hundred yards off, in a water-butt, whither it had to make its way over a cleared hill, where there were no shrubs or trees, which rather puzzled me. During my temporary absence from Javali the servants neglected to feed it, or else I had hoped to bring it to London, to present to Dr. Sclater. It had great strength; and in order to pull it away from the tree to which it was holding, [both] your hands were necessary. On these occasions it used to utter a shrill sound, like a monkey; but I have never on any other occasion heard it utter this sound."

* *Cf. suprà*, p. 183.

2. CHOLOPUS.

Cholœpus, Illiger, Prodr. Syst. Mamm. &c. p. 108 (1811).
Cholopus, Sclater, P. Z. S. 1872, p. 861.

The most obvious external difference between this genus and the last lies in the fore foot, only two of the digits being functionally developed in *Cholopus*. In the skull the tympanic remains in a very imperfect state throughout life; while, on the other hand, the intermaxillaries are better developed than in *Bradypus*, and soon become ankylosed with the maxillaries, forming an angular projection in front of the palate, which corresponds to the curious "spout-like process" into which the front part of the mandible is produced. There are either six or seven cervical vertebræ, and only four molars on each side in the lower jaw; but the anterior pair of teeth, both above and below, are much larger than the rest, being developed into large triangular canine-like weapons, of which the creature can make formidable use.

For long the only known member of the genus was its type, the Unau or Two-toed Sloth of Brazil, *Bradypus didactylus* of Linnæus. In 1858 Professor Peters described a second species, from Costa Rica, under the name of *Cholœpus hoffmanni*, characterized by its long hair and short white claws; and a few years later he was enabled to show, from the examination of no less than six skeletons, that the normal number of cervical vertebræ was *six* in *C. hoffmanni*, instead of *seven* as in *C. didactylus*.

This curious discovery has since been amply confirmed by the examination of other specimens; but, on the other hand, the external characters pointed out by Dr. Peters do not prove quite constant when a large number of examples are compared. It is true that the hair of *C. hoffmanni* is usually longer, of a paler brown, and more often tipped with white than that of *C. didactylus*; but many intermediate specimens occur which it is very difficult to assign to either species. Dr. v. Frantzius observes that the animal is dark, short-haired, and woolly in youth, but becomes longer-haired and paler in colour as it grows up. The comparative length of the claws appears also to depend on age, as suggested by Gray. On the characters of the skull, which Professor Peters considered to be more convex and shorter in the rostrum than that of *C. didactylus*, I can place no weight; for Dr. Krauss has shown how variable are the cranial features of the latter species*, and Dr. v. Frantzius found just as little constancy in Hoffmann's Sloth†.

Mr. O. Thomas's recent discovery of a skin and skeleton of *C. hoffmanni* in a collection formed in Ecuador‡, shows that the range of the form is not so well defined as has hitherto been supposed; and it even suggests a doubt whether the reduction of the vertebræ, on which the separation of the Central-American race appears solely to rest, may not occur more or less frequently as an individual variation in other parts of the

* Arch. f. Naturg. xxxv. 1, pp. 124–129. † Tom. cit. p. 313. ‡ P. Z. S. 1880, p. 402.

range of the genus. It must not be forgotten that the number of cervical vertebræ has been known to vary in *Bradypus**.

Hoffmann's Sloth may be described as being of a more or less uniform brown colour, but varying much in depth of colour. The long hairs are often tipped with white, especially on the nape and back; and the face is whitish, with a dusky spectacle-mark round and between the eyes. It attains a length of about twenty-two inches.

1. Cholopus hoffmanni.

? *Cholœpus didactylus*, Sclater, P. Z. S. 1856, p. 139 (nec Linnæus?)[1].

Cholœpus hoffmanni, Peters, Monatsb. Ak. Berlin, 1858, p. 128 (descr. orig.)[2]; op. cit. 1864, p. 678[3]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 312[4]; Sclater, P. Z. S. 1869, p. 602[5]; op. cit. 1872, p. 861, pl. lxxii.[6]; Gray, P. Z. S. 1871, p. 432[7]; Hand-list Edent. &c. Mamm. p. 2[8].

Perico lijero of Costa-Ricans[4].

Hab. Costa Rica (*Hoffmann*, *Frantzius*, *Carmiol*, *Mus. Berol.*[1 2]); (*Salvin*, *Carmiol*, *Mus. Brit.*[7]); Panama (*Gilman*, *Viv. Zool. Soc.*[5]), Chiriqui (*Bridges*[1]), Veragua (*Boucard*, *Mus. Brit.*).—South America to Ecuador.

As has been already seen, this Sloth was described by Professor Peters from specimens collected by Drs. Hoffmann and v. Frantzius in Costa Rica, and its range has been shown by Mr. Thomas to extend southwards to Ecuador. In the former country Dr. v. Frantzius gives us the following account of its habits:—"The Sloth is found in the high-lying mountain-forests, where it lives in the tops of the trees, and hardly ever leaves them, being enabled by its wonderful climbing powers to pass from one tree to another. On the ground it is utterly helpless. It subsists on leaves and fruit, and in confinement feeds freely on cooked potatoes; all its food is long masticated before being swallowed. Its dung resembles that of sheep or goats. Its voice, which is seldom heard, is like the bleat of a sheep; if seized it snorts violently. It has remarkable power in its claws, with which it can inflict serious wounds, as well as with its canine-like molars; I have seen the finger of a young man thus pierced through and through at the root of the nail.

"A female which I saw had only one young one, which hung on to the long fur of the mother, and which she thus carried about.

"The Sloth is a decidedly nocturnal animal; in daylight the pupils of its eyes are completely closed, but at night they are so widely opened that the iris can hardly be seen; in candle-light they do not re-contract.

"The Sloth possesses an extreme tenacity of life, surviving the most severe injuries, such as fractures of the skull and penetrative wounds in the chest and belly—as well as various poisons in large doses, which only prove fatal after a long time. I found that the best way to kill them was with chloroform, which I placed on a sponge or a bit of

* Rapp, Edentaten (2nd ed.), p. 27; Peters, Monatsb. Ak. Berl. 1864, p. 678.

cotton in the animal's mouth, and then tied a bladder over its head to prevent evaporation"[4].

As Hoffmann's Sloth appears to be more plentiful in Central America than the Three-toed species, it is probably the animal which Captain Dampier met with in his 'Voyages to Campeachy,' and of which he speaks as follows:—

"The Sloth is a four-footed, hairy, sad-coloured Animal; somewhat less than the Ant-bear, and not so rough: Its Head is round, its Eyes small; it has a short Nose, and very sharp Teeth; short Legs, but extraordinary long sharp Claws. This Creature feeds on Leaves, whether indifferently of all sorts, or only on some particular kinds, I know not. They are very mischievous to the Trees where they come, and are so slow in Motion, that when they have eaten all the Leaves on one Tree, before they can get down from that and climb another, and settle themselves to their fresh Banquet (which takes them up five or six Days, though the Trees stand near,) they are nothing but Skin and Bones, although they came down plump and fat from the last Tree. They never descend till they have stript every Limb and Bough, and made them as bare as Winter. It takes them up eight or nine Minutes to move one of their Feet three Inches forward; and they move all their four Feet one after the other, at the same slow rate; neither will stripes make them mend their pace; which I have tried to do, by whipping them; but they seem insensible, and can neither be frighted, or provoked to move faster"*.

Suborder II. ENTOMOPHAGA.

The second suborder of Edentata is a much larger and more heterogeneous assembly than the first, divisible into at least four families, and comprising such varied forms as the Anteaters and Armadillos of America, and the Pangolins and Ant-Bears of Asia and Africa. Both the Neotropical families, Dasypodidæ and Myrmecophagidæ, are represented in our fauna.

Fam. I. DASYPODIDÆ.

1. TATUSIA.

Tatusia, Fréd. Cuvier, ap. Lesson, Man. de Mamm. p. 309 (1827)†.
Dasypus, Wagler, Syst. Amph. &c. p. 36 (1830, nec Fréd. Cuvier).

The Linnæan genus *Dasypus* was co-extensive with the family Dasypodidæ of modern

* Dampier's Voyages, ii. 2, p. 61.

† Frédéric Cuvier called the Armadillos without incisors "Tatusies" (Dents des Mamm. p. 195, 1825); and two years later the name *Tatusia* is given by Lesson as above, "*Dasypus*, L., F. Cuv.," being retained for *D. sexcinctus*. When Wagler divided the Linnæan genus he retained *Dasypus* for the present group; but Cuvier's names have clear priority, and have also the advantage of having been generally used, though almost always with an incorrect reference to the 'Dents des Mammifères.'

zoologists. The labours of Cuvier, Owen, and other anatomists have shown the necessity of generically separating the very marked groups of which it is composed; and these were carefully reviewed and characterized by the late H. N. Turner in the very last of the short but brilliant series of memoirs which was cut off by his untimely death*.

In *Tatusia* the fore foot has only four digits, of which the middle pair are considerably longer than the first and fourth; the ears are placed close together and are directed backwards; there are from twelve to fourteen movable bands or girdles between the scapular and pelvic shields; and the tail is elongate and covered with scutes, which are arranged in rings or whorls, except towards the tip. The only species here recognized as an inhabitant of our subregion, *T. novemcincta*, may be at once known from its congeners by the length of its ears and tail (the former being one third the length of the head, and the latter nearly as long as the body), and by the flatness of the plates of the pelvic shield. The length of the head and body is about twelve inches, that of the tail about the same.

The claims of two other genera of Dasypodidæ to a place in our fauna must here be noticed. Dr. v. Frantzius was informed that a second species of Armadillo existed in Costa Rica, and that it was called *Armado de Zopilote*, because its flesh had the same musky smell as the *Zopilotl* or Black Vulture, *Cathartes atrata* (Bartram). On one occasion only did he see a living example; but he found a skull in the collection of Dr. Joos of Schaffhausen, and identified the animal as *Dasypus gymnurus*, Illiger [=*D. duodecemcinctus*, Schreber, =*Xenurus duodecemcinctus*, auct.], a native of Peru, Brazil, and Paraguay†. Mr. Tomes, on the other hand, in his paper on Mr. Salvin's Guatemalan collections, included *Dasypus minutus*, Desmarest, a Patagonian form, without making any mention of *Tatusia novemcincta*‡. The occurrence of either *Xenurus* or true *Dasypus* in Central America appears highly improbable; and as it is not confirmed by any of the collections to which I have access, I cannot but think that there has been some error of identification in the above records.

1. **Tatusia novemcincta.** (Tab. XXII.)

Dasypus novemcinctus, Linnæus, Syst. Nat. i. p. 54 (1766, descr. orig.)[1]; Baird, Mamm. N. Am. p. 623[2]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 48[3]; Dugès, La Nat. i. p. 138[4].

Dasypus novemcinctus, var. *mexicanus*, Peters, Monatsb. Ak. Berl. 1864, p. 180 (descr. orig.)[5].

Dasypus peba, Desmarest, Mamm. p. 368 (1820, ex Marcgrave)[6]; Moore, P. Z. S. 1859, p. 51[7].

Dasypus fenestratus, Peters, Monatsb. Ak. Berl. 1864, p. 180 (descr. orig.)[8]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 310[9].

Dasypus mexicanus, Fitzinger, Sitzungsb. Ak. Wien, lxiv. 2, p. 363 (1871, ex Peters)[10].

Tatusia mexicana, Gray, Hand-list Edent. &c. Mamm. p. 14, pl. ii. figs. 3, 4 (1873, descr. orig.)[11].

Tatusia leptorhynchus, Gray, op. cit. p. 15, pl. i. figs. 3, 4 (1873, descr. orig.)[12].

* "On the Arrangement of the Edentate Mammalia," P. Z. S. 1851, pp. 205–221.

† Arch. f. Naturg. xxxv. 1, p. 309.

‡ P. Z. S. 1861, p. 287.

Ayotochtli seu *Dasypus cucurbitinus*, Hernandez, Rer. Med. Nov. Hisp. p. 314; De Quad. Nov. Hisp. fol. 2, cap. ii.

Armado, Armadillo, Encubierto of Spanish Americans.

Hab. North America, Texas[2 3].—Mexico (*Mus. Brit.*; *Uhde, Mus. Berol.*; *Liebmann, Mus. Hafn.*), Matamoras (*Couch, U.S. Nat. Mus.*[3]), Guanajuato, Guadalajara (*Dugès*[4]), Yucatan (*Gaumer, Mus. Boucard*); Guatemala (*Mus. Basel*[9]), Volcan de Fuego, Volcan de Atitlan, and forests of Northern Vera Paz (*Salvin & Godman, Mus. Brit.*); Honduras, Comayagua (*Leyland*[7]); Costa Rica (*Hoffmann & Frantzius, Mus. Berol.*[8 9]).—South America to Paraguay.

A Long-tailed Armadillo has long been known to inhabit Mexico and Central America, and till late years has always been referred to the widely distributed species variously known as *Dasypus novemcinctus*, *D. peba*, or *D. longicaudata*. In 1864, however, Professor Peters described an old and a young specimen from Costa Rica as the types of a new species, *D. fenestratus*[8], and, more doubtfully, a Mexican example, as a new variety, *mexicanus*, of *D. novemcinctus*[5]. Seven years later Dr. Fitzinger, in one of his compilations, raised the latter name to specific rank[10]; and in 1873 the late Dr. Gray described *Tatusia mexicana*, apparently independently, from a specimen in the British Museum[11], and added another Central-American species under the name of *T. leptorhynchus* (sic)[12]. After a careful examination of Dr. Peters's and Gray's types, and comparison with a large number of other specimens from both South and Central America, I cannot recognize their claims to specific distinction.

The only external character ascribed to *D. fenestratus* is that the posterior shields of the girdles do not reach their anterior edges; this is merely comparative, and I find that Brazilian specimens vary considerably. In the skull Professor Peters observed that the small openings in the palatine portion of the maxillaries lay between the first molars, the maxillo-palatine suture was behind the last molars, the lachrymal canal opened nearer the orbit, and the palatines were shorter than in *D. longicaudatus* [*T. novemcincta*][8]. But the Armadillos show so much individual variation in minor cranial characters that I cannot regard these differences as of any real value. Accordingly we find that they are not at all constant in Central-American specimens; Dr. v. Frantzius observes that on examining Guatemalan specimens in the Basel Museum he was much astonished to find that they agreed with true *D. novemcinctus*, both in their skulls and in their girdle-shields, though the only conclusion that he drew was that both "species" would probably be found in Costa Rica[9].

The Mexican Armadillo was characterized by Professor Peters as having the snout longer, the loral shields narrower and more numerous, the temporal shields broader and fewer, and the claw of the second digit stouter than in *D. novemcinctus*; some differences in the teeth and skull were alluded to, but not described[5]. Gray gives a somewhat similar account of his *T. mexicana*[11]; and a slight difference in the arrangement

of the scuta of the face, with the usual minor variations in cranial proportions, are the grounds on which he separated his *T. leptorhyncha*[12]. An examination of many specimens convinces me that these slight differences in shield-arrangement and skull-proportions cannot be depended on; and I must therefore regard the Nine-banded Armadillo of Central America as specifically identical with that of Brazil, its range thus extending from Texas to Paraguay.

This Armadillo was first described as a Mexican animal by Hernandez under its Aztec name *Ayotochtli*, and it was well known to the older voyagers. Dampier gives the following characteristic account:—

"The *Armadillo* (so called from its Suit of Armour) is as big as a small sucking Pig: The Body of it pretty long. This Creature is inclosed in a thick Shell, which guards all its Back, and comes down on both Sides, and meets under the Belly, leaving room for the four Legs; the Head is small, with a Nose like a Pig, a pretty long Neck, and can put out its Head before its Body when it walks; but on any danger she puts it in under the Shell; and drawing in her Feet, she lies stock-still like a Land-Turtle: And though you toss her about she will not move herself. The Shell is jointed in the Middle of the Back; so that she can turn the Fore-part of her Body about which way she pleases. The Feet are like those of a Land-Turtle, and it has strong Claws wherewith it digs holes in the Ground like a Coney, the flesh is very sweet and tastes much like a Land-Turtle" *.

Audubon and Bachman observe that they were informed by Captain C. H. Baldwin that the Nine-banded Armadillo is kept tame in Nicaragua to protect houses from the invasion of Ants †. Messrs. Godman and Salvin inform me that in Guatemala the Armadillo is abundant in the primæval forests of the districts lying on both sides of the Cordillera up to an elevation of 4000 or even 5000 feet. Native hunters usually track them to their burrows with dogs, which give notice if an occupant is at home. The hunter then, using his bush-knife as a pick, and his hands as a shovel, commences with the utmost dispatch to dig out the animal, which all the while endeavours to escape by scratching deeper into the ground. It is a race between the Armadillo and the man, and an even chance which succeeds. The tail is the first part seized by the hunter, and then, after a short struggle, the victim succumbs. Various artifices are resorted to by the hunter to prevent the Armadillo from burrowing out of his reach. One, very Central-American in its conception, is for the hunter to place his sandals on the ground over the line of retreat, it being supposed that the animal will not pass under them, but, on reaching this point, will cease its exertions and fall a prey to its pursuer. Other equally efficacious methods are resorted to. The flesh of the Armadillo is tender, white, and usually esteemed a delicacy.

* Dampier's Voyages, ii. 2, pp. 61, 62.

† Quad. N. Am. iii. p. 223.

Fam. II. MYRMECOPHAGIDÆ.

1. MYRMECOPHAGA.

Myrmecophaga, Linnæus, Syst. Nat. i. p. 51 (1766).

The remarkable Neotropical family of true Anteaters is represented in Central America by both its forms, of which the typical genus *Myrmecophaga* is characterized by the fore foot having four toes, and by the structure of its greatly elongated skull, in which the pterygoids unite in the middle line, so as to carry back the bony palate to a level with the auditory meatus. Of the three known species, two (very different in size and general appearance) are members of our fauna, namely:—

1. *M. jubata.* Hair long and coarse, dark grey and black mixed, with a black-and-white oblique stripe on the shoulder; back maned, and tail very bushy. Length about 50″, of tail without hair 30″.
2. *M. tetradactyla.* Hair short; markings rather variable; head, limbs, base of tail, and dorsal stripe white or reddish white; rest of thorax and diagonal stripe on shoulders dark brown or black; tail scaly for its terminal third. Length about 25″, of tail 16″.

The latter species has been generically separated by Gray as *Tamandua* *, and by Wagler as *Uropeltes* †; bnt though it differs from the Great Anteater in its semi-arboreal habits and partially prehensile tail, it agrees with it in all the essential points of structure.

1. Mymecophaga jubata.

Myrmecophaga jubata, Linnæus, Syst. Nat. i. p. 52 (1766, ex Brisson)[1]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 307[2].

Oso real of Costa-Ricans[2].

Hab. Guatemala, Vera Paz (*Sarg*); Costa Rica (*Frantzius*[2]); Panama, Veragua (*Arcé*). —South America to Paraguay.

The range of the Great Anteater extends as far north as Costa Rica and Guatemala. In the former country, Dr. v. Frantzius tells us, it is confined to the low hot forest lands near the coast, and even there it is somewhat rare. When attacked by men or dogs, he was told that it reared itself up and defended itself with its powerful claws; but he himself had only seen one specimen, which had been caught near Puntarenas[2]. As regards its presence in Guatemala, Mr. Sarg informs Messrs. Godman and Salvin

* Ann. of Philos. x. p. 343 (1825).

† Nat. Syst. Amph. &c. p. 36 (1830).

that he has frequently heard of its existence in the forests of the northern part of Vera Paz, but that the only one that had been killed to his knowledge was one obtained by a friend of his near Punta Gorda, on the coast of the Bay of Honduras. From Panama Messrs. Godman and Salvin once received a specimen from their collector Arcé, which they supposed had passed into the British Museum; but such does not appear to have been the case.

Many of the older writers gave a very false account of the habits of the Great Ant-eater, describing it as a fierce beast, a match for the Jaguar, and a source of dread to the Indians. The observations of Azara and Rengger, and of later travellers, prove this to be quite false, the animal being singularly peaceful and harmless, although it certainly attempts to defend itself in danger in the manner mentioned by Frantzius *. Its manner of feeding is well described by Dampier in the following passage:—

"The Ant-Bear is a four-footed Beast, as big as a pretty large Dog; with rough black-brown Hair: It has short Legs; a long Nose and little Eyes; a very little Mouth, and a slender Tongue like an Earthworm about five or six Inches long. This Creature feeds on Ants; therefore you always find them near an Ants Nest or Path. It takes its Food thus. It lays its Nose down flat on the Ground, close by the Path that the Ants travel in, (whereof there are many in this country) and then puts out his Tongue athwart the Path: the Ants passing forwards and backwards continually, when they come to the Tongue make a stop, and in two or three Minutes time it will be covered all over with Ants; which she perceiving draws in her Tongue, and then eats them; and afterwards puts it out again to trapan more. They smell very strong of Ants, and taste much stronger; for I have eaten of them. I have met with these creatures in several places of *America*, as well as here; (*i. e.* in the *Samballoes*) and in the *South-Seas*, on the *Mexican continent*" †.

2. **Myrmecophaga tetradactyla.**

Myrmecophaga tetradactyla, Linnæus, Syst. Nat. i. p. 52 (1766, ex Brisson)[1]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 307[2].

Tamandua tetradactyla, Salvin, P. Z. S. 1861, p. 287[3]; Sclater, P. Z. S. 1871, p. 546, pl. xliii.[4]

Tejon, Oso colmenero of Costa-Ricans[2].

Hab. Mexico (*Liebmann, Mus. Hafn.*); Guatemala, Dueñas (*Salvin, Mus. Brit.*[3]); Costa Rica (*Frantzius*[2]), Punta Arenas (*Salvin*), Nicoya (*Arcé, Mus. Brit.*).—South America to Paraguay.

The range of the Tamandua Anteater appears to extend further north than that of the last species; for there is a specimen in the Copenhagen Museum which was obtained by the late Professor Liebmann in some part of Mexico, probably in Oaxaca; but the exact

* *Cf.* Bates, 'Naturalist on the Amazons,' i. p. 177.

† Dampier's Voyages, ii. 2, pp. 60, 61.

locality has not been noted. Mr. Salvin obtained several specimens on the Volcan de Fuego in Vera Paz, as well as in Costa Rica, where Dr. v. Frantzius also found it, both in the lowlands and in the cooler climate of the central tableland [2]. The specimen obtained by Mr. Salvin at Punta Arenas, in Costa Rica, was found sleeping in the fork of a low tree near the shore.

This Anteater varies considerably in its markings, but Central-American specimens seem to be tolerably constant in this respect. There is considerable difference, however, in the intensity of the dark colour, and in the distance to which the narrow dorsal stripe is produced towards the tail.

2. CLYCLOTURUS.

Cyclothurus, Gray, Ann. of Phil. x. p. 343 (1825).
Myrmydon, Wagler, Nat. Syst. Amph. &c. p. 36 (1830).
Cycloturus, Sclater, P. Z. S. 1871, p. 546 (footnote).

This genus is at once separable from *Myrmecophaga* by the remarkable structure of the fore foot, in which only two toes are developed. The first and fifth digits are entirely absent; the fourth is represented by a rudimentary metacarpal; while the third and second each consist of two phalanges only, and are armed with curved claws, the last-named being much the more slender of the two. The fur is remarkably glossy and silky, and the tail is strongly prehensile. In the skull the facial portion is much arched, and the canal of the posterior nares is not continued backward by the meeting of the palatines and pterygoids, as in the last genus. The ribs are peculiar in being flattened and expanded on their posterior border, so as to lap over one another like tiles.

The only well-established species is a graceful little animal of a more or less yellowish-grey colour, often with a darker longitudinal streak on the back, and sometimes with another on the breast and belly. Its length is about eight inches, that of the tail being about the same.

1. Cycloturus didactylus.

Myrmecophaga didactyla, Linnæus, Syst. Nat. i. p. 51 (1766, ex Brisson) [1].
Cyclothurus dorsalis, Gray, P. Z. S. 1865, p. 385, pl. xix. (descr. orig.) [2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 308 [3].
Serafin de Platanar of Costa-Ricans [3].

Hab. Guatemala, Vera Paz (*Godman & Salvin*, *Mus. Brit.*[2]); Costa Rica, Orosi (*Frantzius*[3]; *Arcé*, *Mus. Brit.*); Panama, Chiriqui (*Arcé*, *Mus. Berol.*).—South America to Northern Brazil and Peru.

In 1865 Gray separated the Two-toed Anteater of Costa Rica from the well-known

South-American species, observing that, besides its general golden-yellow hue, it might be "always known by the distinct well-defined dorsal streak and by the yellow colour of its feet and tail" [2]. A comparison, however, of the types of *Cycloturus dorsalis* in the British Museum with numerous South-American specimens shows that they all belong to one very variable species. Every gradation is present. An example obtained by Mr. Salvin in Guatemala has the fur as much washed with black and not more yellow in tint than in ordinary specimens of *C. didactylus*, while some South-American specimens have yellow feet and others a more or less distinct dorsal streak. In many individuals there is also a median band of blackish or reddish brown on the breast and belly. A form which at first sight seems more worthy of separation is dark grey in colour, with a brilliant silvery sheen and a distinct dark brown stripe down the nape and shoulders. But this also does not appear to be a geographical race, there being a specimen from Colombia in the British Museum and others from Guiana and Trinidad in the Museums of Copenhagen and Lübeck.

According to these views, the Two-toed Anteater has a tolerably extensive range, though less so than the two last species, extending from Northern Brazil and Peru in the south to Costa Rica, Nicaragua, and Guatemala in the north. It does not appear to have been hitherto recorded from Mexico.

In Costa Rica Dr. v. Frantzius obtained this species only from the valley of Orosi, near Cartago, whence he received one living and several dead examples. The former proved to be strictly nocturnal in its habits; during the day it remained rolled up, hanging by its claws to one of the spars of its cage, but at night it clambered slowly but unweariedly round its place of confinement, evidently seeking for a means of escape. It obstinately refused all sorts of food, and was therefore killed after a few days. "In its mode of climbing," says Dr. v. Frantzius, "and its custom of hanging by its claws with its body rolled together, it bears a great resemblance to the *Cholœpus*; but its climbing-powers are greatly aided by its prehensile tail" [3].

Messrs. Godman and Salvin inform me that in Guatemala the Two-toed Anteater is restricted to the thick forests of Vera Paz, where it enjoys a considerable range in altitude; and they add that Mr. Sarg had received specimens from Yaxcabnal, in the northern part of Vera Paz, taken at an altitude of about 1200 feet above the sea, and also from the mountainous district of Purulá, at an elevation of from 4000 to 5000 feet.

Subclass II. DIDELPHIA.

Order IX. MARSUPIALIA.

The great group of Marsupials, separated by most modern zoologists as a distinct subclass of the Mammalia, was widely spread over the globe in geological times; but is now, as is well known, confined to the Australian and Neotropical regions. It is true that one species ranges far into North America; but the order, in the western hemisphere, is essentially characteristic of the Neotropical fauna, and is well represented in our subregion by both the known genera of the only New-World family, Didelphidæ, which differs in several points from all the Australian forms *.

Fam. I. DIDELPHIDÆ.

1. DIDELPHYS.

Didelphis, Linnæus, Syst. Nat. i. p. 71 (1766).
Didelphys, Schreber, Säugth. iii. p. 532 (1778).

Of the two forms of the family Didelphidæ which are well ascertained, the typical genus *Didelphys* is suited for an arboreal, not an aquatic life, and is at once recognizable by its hind feet, the toes of which are not united by a web. It presents a large number of species, often differing from each other considerably in colour and greatly in size, but agreeing in their general habits. The characteristic *marsupium*, or abdominal pouch, is well developed in some species of Opossum, and only rudimentary in others; and Mr. Waterhouse has consequently divided the genus into two sections, under which we may thus characterize the known Central-American Opossums:—

A. *Pouch complete.*

1. *D. virginiana.* Fur with long stiff projecting hairs; yellowish grey, the face lighter, with a dusky mark in front of each eye, and sometimes a trace of a median band; ears and tail variably blotched with dark brown and white. Length about 22″, of tail 15″.

2. *D. aurita.* Like the last species; but the long stiff hairs mostly white above, and the face with three defined blackish-brown stripes; ears black, or black-

* A small Marsupial from Ecuador, named *Hyracodon fulginosus* by Mr. Tomes (P. Z. S. 1863, p. 51, pl. viii.), may represent a distinct family, but it is still only known from the very unsatisfactory original description. In any case it will require a new title, the name *Hyracodon* having been applied to a genus of fossil Ungulates by Professor Leidy in 1856, seven years before its use by Mr. Tomes.

and-white varied; tail black at the base, white towards the tip. Length about 17″, of tail 12″.

3. *D. quica.* Fur soft, with no stiff hairs; dark ashy grey above, yellowish rufous beneath; over each eye a white spot; ears and tail dark, the latter furred for about two inches at its base, white towards the tip. Length about 12″, of tail 11″.

B. *Pouch rudimentary.*

4. *D. cinerea.* Fur short, close, yellowish grey above, white or yellowish white beneath, the eyes bordered with black; tail furred for nearly two inches, dusky near the base, white for distal half. Length about 8″, of tail 10″.
5. *D. derbiana.* Fur rather long, bright rufous above, with a short grey dorsal stripe; forehead with a dusky median stripe; lower parts greyish white; ears pink; tail furred for one third of its length, the naked portion pink, mottled with brown. Length about 13″, of tail 17″.
6. *D. murina.* Fur short, bright rufous on the back, greyish rufous on the flanks, yellowish white beneath; eyes bordered with black; tail furred for only about half an inch, the naked portion yellowish brown. Length from 5″ to 6″, of tail from 6″ to 8″.

1. Didelphys virginiana*.

Didelphis virginiana, Kerr, Linn. An. Kingd. p. 193 (1792, ex Pennant)[1]; Baird, N.-Am. Mamm. p. 232[2].

Didelphys californica, Bennett, P. Z. S. 1833, p. 40 (descr. orig.)[3]; Baird, N.-Am. Mamm. p. 232[4]; Tomes, P. Z. S. 1861, p. 287[5]; Dugès, La Nat. i. p. 138[6].

Didelphys breviceps, Bennett, P. Z. S. 1833, p. 40 (descr. orig.)[7].

Tlacuatzin, Hernandez, Rer. Med. Nov. Hisp. p. 330; De Quad. Nov. Hisp. fol. 3, cap. v.

Tlacuache of Mexicans.

Hab. North America, from the Hudson River southwards.—Mexico (*Uhde*, *Deppe*, *Mus. Berol.*; *Liebmann*, *Mus. Hafn.*; *Verreaux*, *Mus. Brit.*), Guanajuato (*Dugès*[6]), Yucatan (*Gaumer*, *Mus. Boucard*); Guatemala, Coban, Dueñas (*Salvin*, *Mus. Brit.*[5]).

The Opossums of Mexico and California have been believed to differ from those of the United States, and have consequently been separated under the respective names of *Didelphys californica*[3] and *D. breviceps*[7]. Of these the former has been recognized by Professor Baird and other writers as a valid species, specially distinguishable by the

* I have here adopted the earliest name which can be clearly and certainly identified with this species. Linnæus's *D. marsupialis* (Syst. Nat. i. p. 71) is evidently founded on a confusion of the North-American Opossum with some of the South-American forms, probably *D. crancrivora*, Gmelin; and the same remark applies to descriptions of his earlier followers. In such a case it seems advisable to relinquish the uncertain title altogether.

dark colour of the upper part of the head. Dr. Elliott Coues, however, who has enjoyed unusual facilities for observation, and has made this animal a special object of study, finds that "all the characters assigned to these supposed species are to be found in specimens of *D. virginianus* from the same locality," and that no grounds can be shown for separating the Opossums of the South-west even as a geographical race*. A comparison of specimens in European Museums fully confirms Dr. Coues's view, and leads me even to doubt whether *D. virginianus* will not eventually be found to grade into the South-American *D. aurita*. I have not yet, however, seen specimens from Nicaragua, where the two forms appear to meet, and therefore regard the range of the present species as extending from New Jersey and Pennsylvania southwards through the United States and Mexico to Guatemala, whence there are specimens in Mr. Salvin's collections in the British Museum, and where, he informs me, it is common at Coban and elsewhere.

So much has been written of the habits and manners of this well-known Opossum that it seems unnecessary here to do more than to refer to the excellent accounts of Audubon and Bachman and of Dr. Coues.

2. Didelphys aurita.

Didelphys aurita, Max. zu Wied, Beitr. Nat. Brasil. ii. p. 395 (1826, descr. orig.)[1]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 315 [2].

Didelphys azaræ, Temminck, Monogr. de Mamm. i. p. 30 (1827, descr. orig.)[3]; Waterhouse, Nat. Hist. Mamm. i. p. 470, pl. xviii. fig. 2[4].

Zorro of Costa-Ricans [2].

Hab. Costa Rica (*Frantzius*[2]; *Hoffmann*, *Mus. Berol.*).—South America to Uruguay [4].

I have followed Mr. Waterhouse in uniting Temminck's *Didelphys azaræ* with Prince Maximilian's *D. aurita*, but have retained the latter name as it has a year's clear priority. Dr. Burmeister has rejected this identification, on the ground that *D. aurita* has the ears black, while those of the more southern species are white for their terminal half †. But a specimen from Santa Fé de Bogota, Colombia, in the British Museum has the ears *wholly white*; and the observations of Dr. Coues on the North-American species show that no reliance can be placed on this character in discriminating the Opossums. In the colour and character of the fur a good deal of variety also exists, as has been observed by Dr. v. Frantzius in Costa Rica and by Dr. Hensel in Brazil ‡; in some few specimens (of which there are two, without locality, in the British Museum) the long stiff hairs are black instead of whitish.

The range of Azara's Opossum is more extensive than that of any of its congeners, extending from Uruguay, where it was obtained at Maldonado by Mr. Darwin, to Costa

* Proc. Acad. Philad. 1871, pp. 15–18. † Thiere Brasil., Th. i. p. 131. ‡ *Infrà*, p. 198.

Rica, whence there are specimens, collected by Hoffmann and Frantzius, in the Museums of Berlin and Washington. Within this range it has been recorded from Paraguay, Brazil, Bolivia, Peru, and Ecuador; and, as already noticed, it occurs in Colombia. In Guiana it appears to be replaced by the nearly allied but much darker *D. crancrivora*, Gmelin.

Dr. v. Frantzius gives the following amusing account of the habits of Azara's Opossum in Costa Rica:—

"The first of all the Mammals of Costa Rica with which the newly arrived foreigner has an opportunity of making a near if not an agreeable acquaintance is the Long-eared Opossum. In the towns there are few houses that are not infested by these hideous beasts. Often strangers are roused from their slumbers by an unwonted sound, which is really caused by these brutes running with heavy tread over the thin boarding of the roof of the room, or by their upsetting dishes, plates, and other household utensils during a visit to the larder or the kitchen; and the said stranger often fancies that a burglary is being attempted, springs from his bed and grasps his weapons. But if he makes inquiries next day as to the cause of the alarm, he receives one answer, 'Señor, es el Zorro.' Zorro means properly a Fox in Spanish; but the colonists gave the name to the Opossum because it works the same mischief amongst poultry in Costa Rica as the Fox does in Europe, though it cannot compare with the latter in respect to quickness and cunning. Owing to this heaviness and stupidity it easily falls into the hands of its pursuer. It is no unusual thing in Costa Rica to find a newly killed Opossum lying on the street or road, where its flesh is soon devoured by the Vultures. In this way I had no difficulty in collecting a large number of skins and skulls. In the latter I could find no differences after a close comparison. But in the skins I found many variations in the colour of the fur, especially in the long coarse projecting hairs, which in some specimens were white and in others black; in some there were but few bristly hairs, while in others they stood very thick; in fact, as Hensel has shown (Zool. Gart. 1867, p. 290), coloration will not serve here as a specific character.

"In Costa Rica I have never seen Opossums in the open; generally they live beneath the roofs of the houses; and although so many are killed, they are not uncommon. Perhaps their numbers would be diminished if their flesh were considered to be edible; hitherto the ugliness of the brutes seems to have prevented the inhabitants of Costa Rica from preparing them for the table, as is done in Guatemala, where they are even regarded as a delicacy" [2].

3. **Didelphys quica.**

Didelphys quica, Natterer, apud Temminck, Monogr. de Mamm. i. p. 36 (1827, descr. orig.)[1]; Gray, P. Z. S. 1843, p. 79[2]; Tomes, P. Z. S. 1861, p. 287[3]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 317[4].

Tlacuazin of Guatemalans.

Hab. Mexico (*Mus. Berol.*); Guatemala, Dueñas (*Salvin*[3]), Coban (*Mus. Brit.*[2]); Costa Rica, Tucurriqui (*Frantzius*[4]).—South America to Brazil [1].

The range of the Quica Opossum extends from Mexico, whence there are specimens in the Berlin Museum, to Brazil, where Dr. Burmeister obtained an example near New Freiburg. Schomburgk found it in Guiana, and Mr. Thomas includes it among the Mammals collected by Mr. Buckley in Ecuador. Dr. v. Frantzius considered it to be a rare animal in Costa Rica, or at least one which was seldom procured[4].

In Guatemala, Mr. Sarg informs Messrs. Godman and Salvin, the Quica Opossum is common in Coban, living in the houses amongst old boxes, piles of wood, &c., where it makes itself a comfortable nest of scraps of paper. It wanders about at night, invading the kitchen, and feeds on what it can find, especially on oranges and other fruits, eggs, fowls, &c., but avoids meat. When pursued it defends itself with energy, showing and using its sharp formidable teeth.

4. **Didelphys cinerea.** (Tab. XXI.)

Didelphys cinerea, Temminck, Monogr. de Mamm. i. p. 46 (1827, descr. orig.)[1].
? *Didelphys myosurus,* Frantzius, Arch. f. Naturg. xxxv. 1, p. 317 (nec Temminck)[2].

Hab. Costa Rica (*Carmiol, Mus. Brit.*; *Mus. Berol.*), San Ramon (*Frantzius*[2]).—South America to Brazil [1].

Both the British and Berlin Museums possess specimens, collected in Costa Rica by Carmiol, of a small Opossum which appears to be certainly identical with the Brazilian species named *Didelphys cinerea* by Temminck. In the same country Dr. v. Frantzius obtained a single living example of an Opossum which he referred to *D. myosurus*, Temminck (=*D. nudicaudata*, Et. Geoffroy)[2]. The animal unfortunately escaped from its cage and was devoured by dogs, so that positive determination was rendered impossible, but it seems not improbable that it really belonged to the present species.

In Brazil Prince Maximilian zu Neuwied says that the Ashy Opossum is very destructive to poultry, sucking their blood and devouring their eggs. Its odour is stated to be extremely offensive.

5. **Didelphys derbiana.** (Tab. XXII.)

Didelphys derbiana, Waterhouse, Nat. Library, xxiv. (Mamm. x.) p. 97, pl. ii. (1841, descr. orig.)[1]; Nat. Hist. Mamm. i. p. 493 [2].
Didelphys ornata, v. Tschudi, Faun. Peru. p. 146, pl. vi. (1844, descr. orig.)[3].

Hab. Nicaragua (*Mus. Berol.*); Panama, Chepo (*Arcé, Mus. Brit.*).—South America to Peru [3].

This beautifully coloured Opossum was first described by Mr. Waterhouse from a specimen without locality in the collection of the 13th Earl of Derby, in whose honour it was named [1]. Three years later Dr. v. Tschudi described and figured his *D. ornata* from a Peruvian example [3]; but an examination of his diagnosis and plate clearly shows that this animal was specifically identical with Mr. Waterhouse's specimen. The nearest ally of *D. derbiana* appears to be the Paraguayan *D. lanigera*, Desmarest, a much smaller species, in which only the terminal third of the tail is naked.

The range of Derby's Opossum extends northwards from Peru and Ecuador, where it has been obtained by Frazer and Buckley, to Central America—there being a specimen in the British Museum which was obtained by Arcé at Chepo, in the State of Panama, and one in the Berlin Museum from Nicaragua. This latter State seems to be its northern boundary, as it is not included in any of Messrs. Godman and Salvin's collections; and it is probably not a common species in any part of Central America.

Our Plate represents a female Derby's Opossum with three young ones, living in the Zoological Society's Gardens in May 1877; and is taken from an original sketch from the life by Mr. Smit, for which I am indebted to the kindness of Mr. Sclater. It well illustrates the way in which the young of the pouchless Opossums cling to the back and flanks of their mother, both by their claws and by their prehensile tails. When this female was excited or annoyed, her naked pink ears flushed to a deep rose-colour; and she always showed herself ready to do battle in defence of her helpless family.

6. **Didelphys murina.**

Didelphis murina, Linnæus, Syst. Nat. i. p. 72 (1766, descr. orig.)[1]; Waterhouse, N. H. Mamm. i. p. 508 [2]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 318 [3].

? *Didelphis cayopolin*, Gmelin, Linn. Syst. Nat. i. p. 106 (1788, ex Hernandez)[4].

? *Coyopollin*, Hernandez, De Quad. Nov. Hisp. fol. 10, cap. xxix.

Tlacuazin raton of Guatemalans.

Hab. Mexico (*Waterhouse* [2]); Guatemala, San Gerónimo (*Godman & Salvin, Mus. Brit.*), Coban (*Sarg, Mus. Brit.*; *Mus. Berol.*); Costa Rica (*Frantzius* [3]); Panama, Veragua (*Arcé, Mus. Brit.*).—South America to Brazil [2].

In the Neotropical region the place of the absent placental Insectivores is filled by several very small species of *Didelphys*. Of these the Murine Opossum is the best-known and most widely distributed, its recorded range extending from Southern Mexico to Guiana and Eastern Brazil. In Guatemala the *Tlacuazin raton* is a rare animal. Mr. Sarg's specimens were obtained in hollow trees; one of these, now in the British Museum, is an unusually large male, its head and body measuring six inches and its tail nearly eight inches.

In spite of its small size, this species does not confine itself to a purely insectivorous diet, but preys also on small birds; Temminck found feathers in the stomachs of several

specimens which he dissected. He adds that it burrows in the earth, and suspends itself by the tail to the branches of trees, feeding partly on fruit, as do several of its congeners *.

2. CHIRONECTES.

Chironectes, Illiger, Prod. Syst. Mamm. p. 76 (1811).

One species of the Didelphidæ is so far modified for an aquatic life that its claim to generic distinction has been almost universally recognized. Still the distinctive characters of *Chironectes* are not of fundamental consequence, the most important being:—the complete webbing of the hind feet, which are proportionally very large; and the great development of the pisiform bone of the carpus, which causes a tubercle on the outer side of the fore foot, resembling a rudimentary sixth digit. In the female the pouch is well developed.

The only known species of *Chironectes* is a small animal of handsome markings, its ground-colour of clear grey being varied by large confluent patches of velvety black on the head and back. It attains a length of about twelve inches, with a tail of from thirteen to fifteen inches.

1. Chironectes variegatus †.

Lutra minima, Zimmermann, Geogr. Gesch. ii. p. 317 (1780, ex Buffon)[1].
Lutra saricovienna, Shaw, Gen. Zool. i. pt. 2, p. 447 (1800, ex Buffon)[2].
Chironectes variegatus, Illiger, Abh. Ak. Berlin, 1811, p. 107 (descr. orig.)[3]; Frantzius, Arch. f. Naturg. xxxv. 1, p. 318[4]; Sclater, P. Z. S. 1871, p. 702[5].
Tlacuazin de agua of Guatemalans.
Zorro de agua of Costa-Ricans[4].

Hab. Guatemala (*Salvin*), Coban (*Sarg*); Costa Rica (*Frantzius*[4]).—South America to Brazil.

First described from Guiana[1], the Yapock or Water-Opossum has a pretty extensive range, being found in suitable localities in the northern parts of Brazil, Guiana [1], and

* Monogr. de Mamm. i. p. 51.

† I have retained Illiger's well-known specific name [3], instead of reviving either of the forgotten titles previously bestowed by Zimmermann [1] and Shaw [2], for the following reasons. There can be no doubt that Zimmermann's *Lutra minima* was intended for the present species, it being founded on *la petite Loutre de Guayane* of Buffon (Hist. Nat. Suppl. iii. p. 157, pl. xxii.); but the name *minima* when applied to the only known member of a genus is so misleading as to come fairly under Rule XI. of the Stricklandian code. *Lutra saricovienna* of Shaw is compounded of the above-named *petite Loutre de Guayane* and *la Saricovienne* of Buffon (Hist. Nat. xiii. p. 319), which is identified by Buffon himself with the *Carigueibeju* of Marcgrave (Hist. Nat. Bras. p. 234), the *Lutra brasiliensis* of Brisson and of modern zoologists. Shaw's title may therefore be at once dismissed, and Illiger's name retained as the earliest which can be satisfactorily used for the present species.

PA. 13

Colombia [5], and probably throughout the other countries of northern South America. In Costa Rica, where it is known to the inhabitants as *Zorro de agua* (Water-Opossum), Dr. v. Frantzius considered it not to be rare, though the number of specimens which came under his own observation was not large [4]. In Guatemala Mr. Salvin did not obtain any specimens himself; but a drawing by Mrs. Salvin of an animal preserved in the Museum of the Sociedad Economica de Guatemala clearly represents this species. Mr. Sarg informs Messrs. Godman and Salvin that several pairs have been observed in the river of Coban, and two that he obtained were shot when playing on a stone in the water; they are supposed to feed on the crayfish (*Cambarus*) common in this river.

In Brazil, Natterer informed Mr. Waterhouse, "the Water-Opossum feeds on Crustacea, and, doubtless, on other aquatic animals. One of his specimens was captured in the water alive, near Para, in a basket similar to those used in this country for catching eels; it had made its way through the funnel-shaped opening, and could not return, thus proving that these animals are good divers" *. Other writers have stated that the Yapock is partly vegetarian in its diet; but the observation appears to require confirmation.

* Waterhouse, Nat. Hist. Mamm. i. p. 535.

SUPPLEMENT*.

In the first parts of this volume I adopted, owing to an unfortunate misunderstanding, a different northern limit of the Central-American subregion from that selected by the Editors of the work. Instead of taking the valleys of the Rio Grande and Gila as a boundary, I drew the line at the 25th parallel of north latitude, thus rejecting many Nearctic species which extend into the Northern-Mexican States of Sonora, Chihuahua, &c. Although I am still of opinion that the latter is the most natural limit of the subregion, it is evident that uniformity with the rest of the work demands the adoption of the more northern boundary; I therefore accepted it in the rest of the volume; and I now notice the few species of Bats and Insectivores which were omitted in the early parts. I have also added what little further information has reached me while going through the press, and have corrected one or two of the graver errors into which I have fallen, thus bringing up the subject, to the best of my power, to the date of the completion of publication.

The additional genera and species are marked thus "(N.)," and are duly incorporated in the tables which will be given in the Introduction.

VESPERUGO (p. 19).

Under this heading I should have noticed *Scotophilus miradorensis*, a provisional name proposed by Dr. H. Allen for a Bat of that genus, of which a single specimen was sent by Dr. Sartorius from Mirador, Vera Cruz, to the Smithsonian Institution †. Along with the other Bats described by Dr. Allen at the same time, I omitted *V. miradorensis* in hopes of being able to obtain the type for examination; but in this I have been disappointed (*cf. infrà*, p. 205, *sub voce* Vespertilio).

[Vesperugo parvulus (p. 21).

A specimen of this species has been obtained by Mr. A. Forrer in the Tres Marias Islands, the locality from which Mr. Allen's types were procured.—O. T.]

* [This Supplement was left by Mr. Alston in an almost complete state at the time of his death on the 7th of March 1881. The few additional specimens that have since come into our hands have been determined by Mr. Oldfield Thomas, who has in certain cases added a few notes respecting them. These will be found in brackets in their proper places with Mr. Thomas's initials attached to them.—Edd.]

† Proc. Acad. Philad. 1866, p. 287 (descr. orig.).

(N.) ANTROZOUS.

Antrozous, H. Allen, Proc. Acad. Philad. 1862, p. 248.

This genus differs from the rest of the family in having only four lower incisors; and it is also exceptional in the possession of a rudimentary discoid nose-leaf, the only other Vespertilionine Bat which shares the latter peculiarity being the Old-World genus *Nyctophilus*. Only one species of *Antrozous* is known, a pale-yellowish-brown-coloured Bat, with a forearm of about two inches.

(N.) **Antrozous pallidus.**

Vespertilio pallidus, Leconte, Proc. Acad. Philad. 1855, p. 437 (descr. orig.)[1]; Baird, Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 4[2].

Antrozous pallidus, H. Allen, Mon. Bats N. Am. p. 68[3]; Dobson, Cat. Chir. Brit. Mus. p. 171[4].

Hab. North America, western regions, from Oregon southwards[3].—Mexico, Sonora[2].

This peculiar Bat appears to be not uncommon in the Rocky-Mountain province, going as far north as Oregon (whence it has been sent to the United-States Museum by Dr. Suckley[3]), and extending southwards to Northern Mexico. "Numerous specimens of this species," says Professor Baird, "were collected by the Boundary Commission in Texas, New Mexico, Sonora, and California. The one described by Major Leconte was taken at El Paso"[2].

(N.) NYCTICEJUS.

Nycticejus, Rafinesque, Journ. de Phys. lxxxviii. p. 417 (1819, fide H. Allen, Mon. Bats N. Am. p. 11).

Nycticejus agrees with the closely allied genus *Atalapha* in having only two upper incisors, but differs in the nakedness of its interfemoral membrane, in the form of its small subtriangular ear, and in the shape of its tragus, which has a straight inner margin instead of being curved boldly inward. *N. crepuscularis*, the only known species *, is a small Bat, with a forearm of about 1″·40; its fur is brown, tipped with a lighter tint.

(N.) **Nycticejus crepuscularis.**

Vespertilio crepuscularis, Leconte, M'Murtrie's Cuv. An. Kingd. i. p. 432 (1831, descr. orig. fide H. Allen)[1], Proc. Ac. Philad. 1856, p. 433[2].

Nycticejus crepuscularis, H. Allen, Mon. Bats N. Am. p. 12[3]; Dobson, Cat. Chir. Brit. Mus. p. 266[4].

Hab. North America, from New York southwards[4].—Mexico, Matamoras (*Berlandier*, *U.S. Nat. Mus.*[3]).

* It is to be remembered that though several Old-World Bats have been referred to *Nycticejus* by Temminck and other writers, they have been generically separated by Professor Peters and Mr. Dobson under Leach's name *Scotophilus*: cf. suprà, p. 19, footnote.

The range of this species extends, according to Mr. Dobson, "from New York to the Rocky Mountains, and southwards to New Orleans and to the West-Indian Islands (Cuba)"[4]. Dr. Allen mentions two specimens from Matamoras as included in the Berlandier collections[3], which Lieut. D. N. Couch purchased and presented to the Smithsonian Institution; and there is a skin in the British Museum said to be from Central America[4].

ATALAPHA (p. 22).

[**Atalapha noveboracensis** (p. 22).

A specimen of the *frantzii* variety of this species was taken by Mr. Forrer in the Tres Marias.—O. T.]

(N.) **Atalapha intermedia.**

Lasiurus intermedius, H. Allen, Proc. Acad. Philad. 1862, p. 146 (descr. orig.)[1]; Mon. Bats N. Am. p. 25[2].

Atalapha intermedia, Peters, Monatsb. Ak. Berl. 1870, p. 912[3]; Dobson, Cat. Chir. Brit. Mus p. 274[4].

Hab. North America, Texas[4].—Mexico, Matamoras (*Berlandier, U.S. Nat. Mus.*[2]; *Mus. Berol.*).

As I observed above, this Bat being found at least as far south as Matamoras, according to the limits now adopted it must of course be accepted as a member of our fauna.

Atalapha intermedia is the type of Professor Peters's subgenus *Dasypterus*[3], characterized by the possession of only one upper premolar on each side, and by the interfemoral membrane being hairy on its anterior half or two thirds only. From the two other members of the subgenus, *A. egregia*, Peters, and *A. ega* (Gervais), it may be at once distinguished by its olive-brown fur, its obtuse and curved tragus, and by its interfemoral membrane being naked on its posterior third only. Its forearm measures about two inches.

VESPERTILIO (p. 23).

In 1866 Dr. H. Allen published some "Notes on the Vespertilionidæ of Tropical America"*. In this paper he gave provisional names to several specimens in the Museum of the Smithsonian Institution which appeared to him to be new, observing that, "should any or all of them prove to be old species, their descriptions can, without confusion, be added to the original meagre diagnoses, and may thus add to what little we know of these obscure animals." Of the genus *Vespertilio* three of these species were described

* Proc. Ac. Philad. 1866, pp. 279–288.

from Central-American specimens, namely:—*V. concinnus* (p. 280) from Salvador; *V. exiguus* (p. 281) from Aspinwall, Panama; and *V. agilis* (p. 282) from Mirador, Mexico. As in the case of *Vesperugo miradorensis**, I purposely delayed mention of these in the hope of having the opportunity of examining Dr. Allen's types; but as I have not been able to do so, I can only draw attention to his original descriptions. From these it is unfortunately impossible to decide whether the species have been previously described or not.

[**Vespertilio nigricans** (p. 24).

A specimen of this species was obtained by Mr. Forrer in the Tres Marias Islands, a locality considerably to the north of any locality hitherto recorded for it.

Mr. Alston's notes include a reference to *Vespertilio mexicanus*, De Saussure†, from Mexico; but he does not seem to have recognized the species; the description, however, agrees very fairly with this species, of which De Saussure's name would therefore be a synonym. The type of *V. mexicanus* was obtained from the Province of Mexico, and therefore from quite the same locality as the Mexican *V. nigricans* mentioned above (p. 25).—O. T.]

(N.) **Vespertilio subulatus.**

Vespertilio subulatus, Say, Long's Exped. ii. p. 65 (1823, descr. orig., fide H. Allen)[1]; H. Allen, Mon. Bats N. Am. p. 51[2]; Dobson, Cat. Chir. Brit. Mus. p. 324[3].

Hab. North America, from Nova Scotia southwards[2].—Mexico, Sonora (*Schott*, *Clark*, *U.S. Nat. Mus.*[2]).

The "Little Brown Bat" of American authors has the ears longer than the head, proportionally large feet, the wing-membranes starting from the base of the toes, and the last caudal vertebra free. The forearm has a length of about 1″·50; and the fur is almost black, tipped above with yellowish brown, and beneath with yellowish white. Mr. Dobson observes that it "approaches *V. mystacinus*, but not so closely as *V. nitidus*. The ears are larger; and the outer margin of the ear-conch is not deeply emarginate above; the feet are also larger; and the last caudal vertebra is free"[3].

The most southern locality for *V. subulatus* with which I am acquainted is Sonora, several specimens collected in that State by the officers of the United-States Mexican Boundary Survey being now preserved in the National Museum at Washington[2].

[**Saccopteryx plicata** (p. 29).

Two specimens of this species were obtained by Mr. Forrer at San Blas, on the coast of Mexico, opposite the Tres Marias. Its occurrence there affords another example of the affinity of the fauna of this part of Mexico to that of Costa Rica, the type of the species having come from that State. (See below, under *Procyon cancrivorus*.)—O. T.]

* *Cf. suprà*, p. 203.

† Rev. et Mag. Zool. 1860, p. 282 (descr. orig.).

[Diclidurus albus (p. 30).

Another specimen of this rare Bat has been obtained by Mr. Champion at Champerico, Guatemala, and is now in the British Museum. The northern extension of this species to Guatemala is thus confirmed, Mr. Sarg's specimen mentioned above having hitherto been the only one known from that State.—O. T.]

[Macrotus waterhousii (p. 38).

Two specimens of this species were obtained by Mr. Forrer in the Tres Marias Islands. The true *M. waterhousii* has hitherto been recorded with certainty only from the eastern parts of Mexico and the West-Indian Islands; but its occurrence in the Tres Marias would seem to confirm the identity of Baird's *M. californicus* with it.—O. T.]

[Chilonycteris rubiginosa (p. 35).

The occurrence of this Bat in Mexico, given above on the authority of the list of Bats in the Washington Museum, has now been confirmed by the capture of a specimen near Mazatlan, Mr. A. Forrer having sent a specimen from that place to Messrs. Salvin and Godman.—O. T.]

CHŒRONYCTERIS (p. 46).

[Chœronycteris mexicana (p. 46).

An immature specimen of this somewhat rare species is contained in Mr. Forrer's Tres-Marias collection.—O. T.]

(N.) **Chœronycteris minor.**

Chœronycteris minor, Peters, Monatsb. Ak. Berl. 1868, p. 366 (descr. orig.)[1]; Dobson, Cat. Chir. Brit. Mus. p. 511[2]; Rep. Brit. Assoc. 1880, p. 196[3].

Hab. Guatemala (*Champion, Brit. Mus.*[3]).—South America to Guiana[1] and Brazil[2].

When my account of this genus was written this second species was only known from Guiana[1] and Brazil[2]; but a specimen has since been received by Messrs. Godman and Salvin from Guatemala from their collector Mr. Champion, and is now in the British Museum.

As already noticed, *Chœronycteris minor* may easily be distinguished from *Ch. mexicana* (which it resembles in colour) by its conspicuously smaller size, its forearm measuring 1″·35, as against 1″·70, by its ear being shorter and less deeply emarginate, and by the length of the calcaneum, which considerably exceeds that of the foot.

Chiroderma salvini (p. 49).

The range of this species extends to Colombia, Mr. Dobson having recently found an

example among the Bats belonging to the collection of the Göttingen Museum, which is labelled as being from Popayan, an elevated locality in the Andes, 6000 feet above the sea-level. Mr. Dobson remarks that this specimen has only "faintly marked facial streaks, and a very narrow white line in the fur along the lower half of the spine. This shows that the white streaks are as variable in this species as I have already noticed in the case of *Artibeus planirostris* (Catal. Chirop. Br. Mus. p. 516). The important structural characters on which the species depends are, however, as well marked [as] in the only specimen hitherto known (the type in the collection of the British Museum), which was collected by Mr. Salvin in Costa Rica, and named by me after the discoverer"*.

[**Sturnira lilium** (p. 50).

This somewhat common Bat has not been hitherto recorded north of Guatemala and Honduras; but Mr. F. Gaumer has recently sent to Messrs. Godman and Salvin, through M. Boucard, a specimen obtained by him in 1880, in Northern Yucatan, showing a considerable extension of its northward range.—O. T.]

(N.) **Blarina berlandieri.**

Blarina berlandieri, Baird, Mamm. N. Am. p. 53 (1857, descr. orig.)[1]; Rep. U.S. Mex. Bound. Surv. ii. Mamm. p. 5[2].

Hab. Mexico, Matamoras (*Couch*, *U.S. Nat. Mus.*[1]), Tlalpam (*Geddes*, *Mus. Brit.*).

As already observed (above, p. 57), Dr. Coues has expressed some doubt as to the specific distinction of Berlandier's Shrew from the *Blarina micrura* of Guatemala and Costa Rica and the *B. exilipes* of Texas. The comparison of large suites of specimens will be necessary before deciding on the relationship of these forms, of which *B. berlandieri* appears to agree with *B. micrura* in size and proportions, but to differ in coloration, the lower parts being yellowish white instead of dull grey as in the southern form.

Professor Baird's type specimens were from Matamoras, and formed part of Berlandier's collections, which were secured by Lieut. Couch for the National Museum at Washington[1]. An example, which agrees well with the descriptions of *B. berlandieri*, has been lately received by the British Museum from Mr. P. Geddes, and is labelled as having been obtained at an elevation of 7000 feet, at Tlalpam, near the city of Mexico.

[**Procyon cancrivorus**† (p. 69).

A Raccoon precisely agreeing with the Veraguan specimen of *P. cancrivorus* mentioned above by Mr. Alston has been obtained by Mr. Forrer in the Tres Marias Islands. The occurrence of this, the southern species, in these islands, 2000 miles north of the most northern locality hitherto known for it, is particularly interesting as

* P. Z. S. 1880, p. 465; Rep. Brit. Assoc. 1880, p. 197.

† Not *crancrivorus*, as accidentally printed above.

furnishing another instance of the peculiar affinity of their fauna to that of Southern Central America. In fact, as Mr. Salvin informs me, this fauna seems to be, in the first place, very closely allied to that of Mazatlan and the neighbouring parts of Western Mexico; and then, missing the whole of Southern Mexico, Guatemala, and Nicaragua, its next nearest affinities are with Costa Rica, Panama, Colombia, and other parts of North-Western South America*. (See also below, p. 211, under *Lepus graysoni*.)

BASSARICYON (p. 70).

When treating above of *Bassaricyon gabbi*, I was in great hopes that the lost skin of Mr. Allen's unique type specimen might be recovered in time to be described and figured in this Appendix. Although disappointed in this respect, I have to record that my friend Mr. Oldfield Thomas has detected a second example of the genus in the fine collection of mammals formed by Mr. Clarence Buckley in Ecuador. The skull of this example agrees in all essentials with that of *B. gabbi*, but differs in minor details, which seem to indicate specific distinction; and Mr. Thomas has therefore named it *B. alleni*, in honour of the founder of the genus †.

The most remarkable fact about this Ecuador *Bassaricyon* is its strange external resemblance, both in form and colour, to *Cercoleptes caudivolvulus*; in fact, in Mr. Thomas's words, it is only to be distinguished by "the flatness of the head and the greyness of the face, as compared with the high head and yellowish face of the Kinkajou." This resemblance is the more extraordinary as the skulls of both *B. gabbi* and *B. alleni* indicate a much closer relationship to *Nasua* and *Procyon* than to the other genera of the family.

As soon as I was acquainted with this interesting discovery I wrote to Mr. Allen suggesting that the lost skin of his type might have been mislaid among the specimens of *Cercoleptes* in the National Museum at Washington. In a recent letter, however, he informs me that the most careful search has been made in vain; we must therefore wait for more specimens to show whether *B. gabbi* agrees with *B. alleni* in its extraordinary superficial likeness to *Cercoleptes caudivolvulus*.

[**PHOCIDÆ—OTARIIDÆ** (p. 89).]

Under this head I quoted Dampier's account of the Seals which were taken in his time off the coast of Yucatan, remarking that I had been unable to find any modern evidence of the existence of Seals on the east coast of Central America, and observing that the species most likely to occur there would be the West-Indian forms named *Phoca*

* The range of *Rhodinocichla rosea*, Less., as given by Messrs. Salvin and Godman (Aves, p. 39), affords another excellent example of the facts here mentioned.

† See P. Z. S. 1880, p. 397, pl. xxxviii. (descr. orig.).

tropicalis and *Cystophora antillarum* by Gray. Since this passage passed through the press Mr. J. A. Allen has published his exhaustive 'History of North-American Pinnipeds'*, in which he quotes a letter from Mr. R. W. Kemp, of Key West, Florida, as follows:—"Some two or three years ago there were two [Seals] seen near Cape Florida. It was supposed that they had strayed from some of the Bahama Islands, as there are some few to be found in that vicinity. I am informed by reliable parties that Seals are to be found in great numbers at the Anina Islands, situated between the Isle of Pines and Yucatan. . . . . The Seals are said to be very easily killed or captured alive. They yield a great deal of oil. The skins are very large, but not easy to cure on account of their fatty substance." In a second letter Mr. Kemp alludes to their comparative abundance on the coasts of Yucatan; and Mr. Allen observes that in several maps the name of "Seal Kays" is given to certain islets off the Mosquito coast, in about 12° 40′ north latitude†.

These Seals Mr. Allen refers to "*Monachus*? *tropicalis*"‡, as the only Pinniped which has been satisfactorily established as a native of the Gulf of Mexico §; and although no specimens have yet fallen into the hands of zoologists this identification may be provisionally accepted. Very little is known of *M. tropicalis*; but according to Mr. Gosse's description ‖, and the imperfect type specimen in the British Museum, it appears to be nearly allied to *Monachus albiventris* (Boddaert), which is the common Seal of the Mediterranean and of the adjoining parts of the Western Atlantic. Its fur is nearly uniform black, with greyish tips; and the males are said to attain a length of nearly ten feet.

With regard to the occurrence of Sea-Lions or Seals on the Pacific coast of Central America, Mr. Allen draws attention to the fact (which had escaped me) that Dampier met with "Seals" in 1686 both at the Chametly Islands, in 23° 11′ north latitude, and at the Tres Marias, about two degrees further south. In his 'New Voyage round the World' he writes of the former group:—"The Bays about the Islands are sometimes

* Miscellaneous Publications of the U.S. Geological and Geographical Survey of the Territories, No. 12 (Washington, 1880).

† *Op. cit.* pp. 721, 722.

‡ *Phoca tropicalis*, Gray, Cat. Seals Brit. Mus. p. 28 (1850, descr. orig.); *Monachus tropicalis*, Gray, Cat. Seals and Whales Brit. Mus. p. 20 (1866); Handlist Seals Brit. Mus. p. 11 (1874); [*Phoca*] *wilkianus*, Gosse, Nat. in Jamaica, p. 307 (1851, descr. orig.).

§ Mr. Allen has satisfactorily disposed of the claims of the only other described species, *Cystophora antillarum*, by showing that the type specimens were *not* received from Mr. P. H. Gosse, as repeatedly stated by Gray. Mr. Gosse has himself assured Mr. Allen that the only skin delivered by him to the British Museum from Jamaica was that of the "Pedro Seal," *i. e.* the type of *Monachus tropicalis*. There can be little doubt that Gray was in error both as to the locality and as to the collector of his specimens; for, as Mr. Allen observes, "the genus *Cystophora*, as now known, is a subarctic type, the occurrence of which within the tropics seems at least very improbable" (*op. cit.* p. 720).

‖ 'Naturalist in Jamaica,' pp. 107–114.

visited with Seal; and this was the first place where I had seen any of these Animals, on the North-side of the Equator, in these Seas. For the Fish on this sandy Coast lye most in the Lagunes or Salt-lakes, and Mouths of Rivers; but the Seals come not so much there, as I judge: For this being no rocky Coast, where Fish resort most, there seems to be but little Food for the Seals, unless they will venture upon Cat-Fish"*. At the Tres Marias Islands he found "the Sea also pretty well stored with Fish, and Turtle or Tortoise, and Seal. This is the second Place on this Coast where I did see any Seal: and this place helps to confirm what I have observed, that they are seldom seen but when there is plenty of Fish"†.

Mr. Allen supposes these "Seals" to have been the Californian Sea-Lion‡, but observes that they may have been the Northern Sea-Elephant §, although in that case Dampier would probably have alluded to their great size ‖. At any rate there seems to be no doubt that both Sea-Lions and Sea-Elephants are now extirpated on the Pacific coast between California and Peru, although Captain Scammon alludes to the existence of the former animal "on the Mexican coast" some years previous to 1852 ¶.

[**Lepus graysoni** (p. 177).

Two specimens of this species from the typical locality (the Tres Marias Islands) were collected by Mr. Forrer. One is a full-grown male, obtained on the 23rd of April, and the other an immature female, killed on the 10th of March of the present year.

These Hares, which quite agree with Mr. Allen's description, seem certainly to be very closely allied to *L. sylvaticus*; but without seeing more specimens I do not care to express any definite opinion on this point. There can be no doubt, however, that, if not a species, *L. graysoni* represents at least a distinguishable race or variety, of which the distribution presents us with another instance of the already mentioned remarkable affinities possessed by the fauna of the Tres Marias Islands, since Mr. Allen refers in his original description to a second specimen of this form collected by J. Carmiol at Talamanca, Costa Rica.—O. T.]

* Dampier's Voyages, i. pp. 263, 264.

† Tom. cit. p. 276.

‡ *Otaria californiana*, Lesson, = *Zalophus californianus*, Allen, = *Otaria gillespii*, M'Bain (cf. suprà, p. 90).

§ *Macrorhinus angustirostris*, Gill, = *M. leoninus* (Linn.)? (cf. suprà, p. 90).

‖ Hist. N.-Am. Pinnipeds, pp. 289, 290, 751, 752.

¶ Marine Mamm. N. Am. pp. 130–135. It seems not improbable that the former occurrence of Pinnipeds on these coasts may have given rise to the reports of the existence of *Manatus australis* in the Pacific (cf. suprà, p. 95).

[**Didelphys murina** (p. 200).

An Opossum referable to this widely-distributed species forms the third of the land Mammalia obtained by Mr. Forrer in the Tres Marias Islands, the Raccoon and the Hare already mentioned being the other two. According to Mr. Forrer these three are the only land mammals indigenous to the islands, though one would have expected that some of the numerous Muridæ inhabiting the neighbouring mainland would be represented; it appears, however, that the inhabitants know of no rats or mice whatever in the islands, except, of course, the cosmopolitan *Mus decumanus*, Pall.—O. T.]

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[Names in small capitals refer to Families &c.; those in Roman type to the chief reference to each species included in the work those in italics to species incidentally mentioned, synonyms, &c.]

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Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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J.G.Keulemans lith. M&N.Hanhart imp

J.G.Keulemans lith. M&N.Hanhart imp

MYCETES VILLOSUS.

Mammalia Tab. I. Brit. Mus.

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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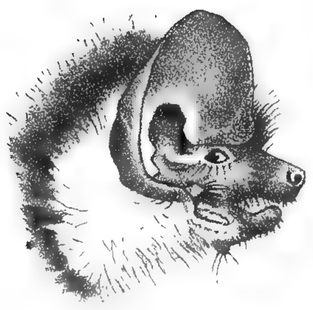
Hanhart imp. 54

CHRYSOTHRIX OERSTEDI.

Mamm. Tab. 2.



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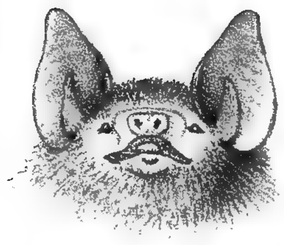

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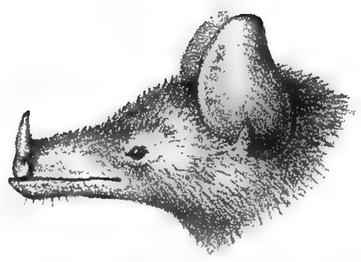

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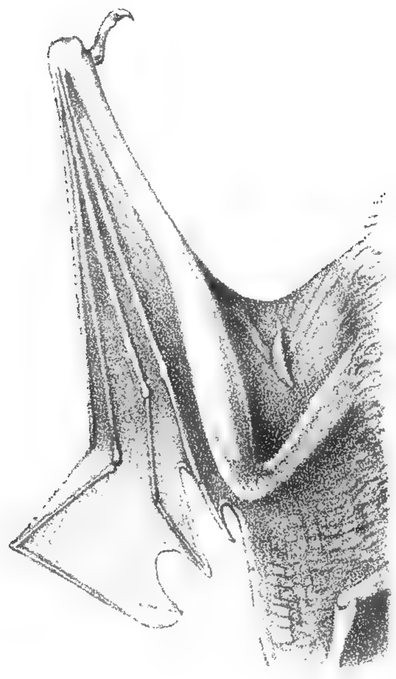

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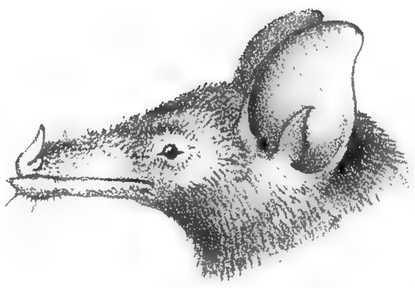

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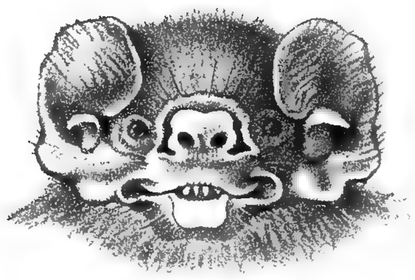

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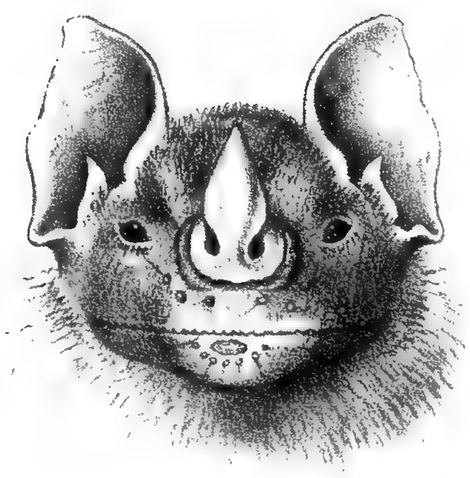

7.

8.

1. VESPERUGO ALBIGULARIS. 2. VESPERUGO PARVULUS. 3. GLOSSONYCTERIS LASIOPYGA.
4. SACCOPTERYX PLICATA. 5. ISCHNOGLOSSA NIVALIS. 6. DIPHYLLA ECAUDATA.
7. VAMPYROPS VITTATUS. 8. CENTURIO MACMURTRII.

C. Berjeau lith. Mintern Bros imp

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Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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Hanhart imp. 32 J.Smit lith.

CHIRODERMA SALVINI.

Blas del Gentr. Am. Mammalia Tab. 4

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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PTERONOTUS DAVYI. MEXICO.

PTERONOTUS DAVYI. ELARINA MICRURA

2

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
KODAK Color Control Patches © The Tiffen Company, 2000
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BASSARIS RAPTOR.

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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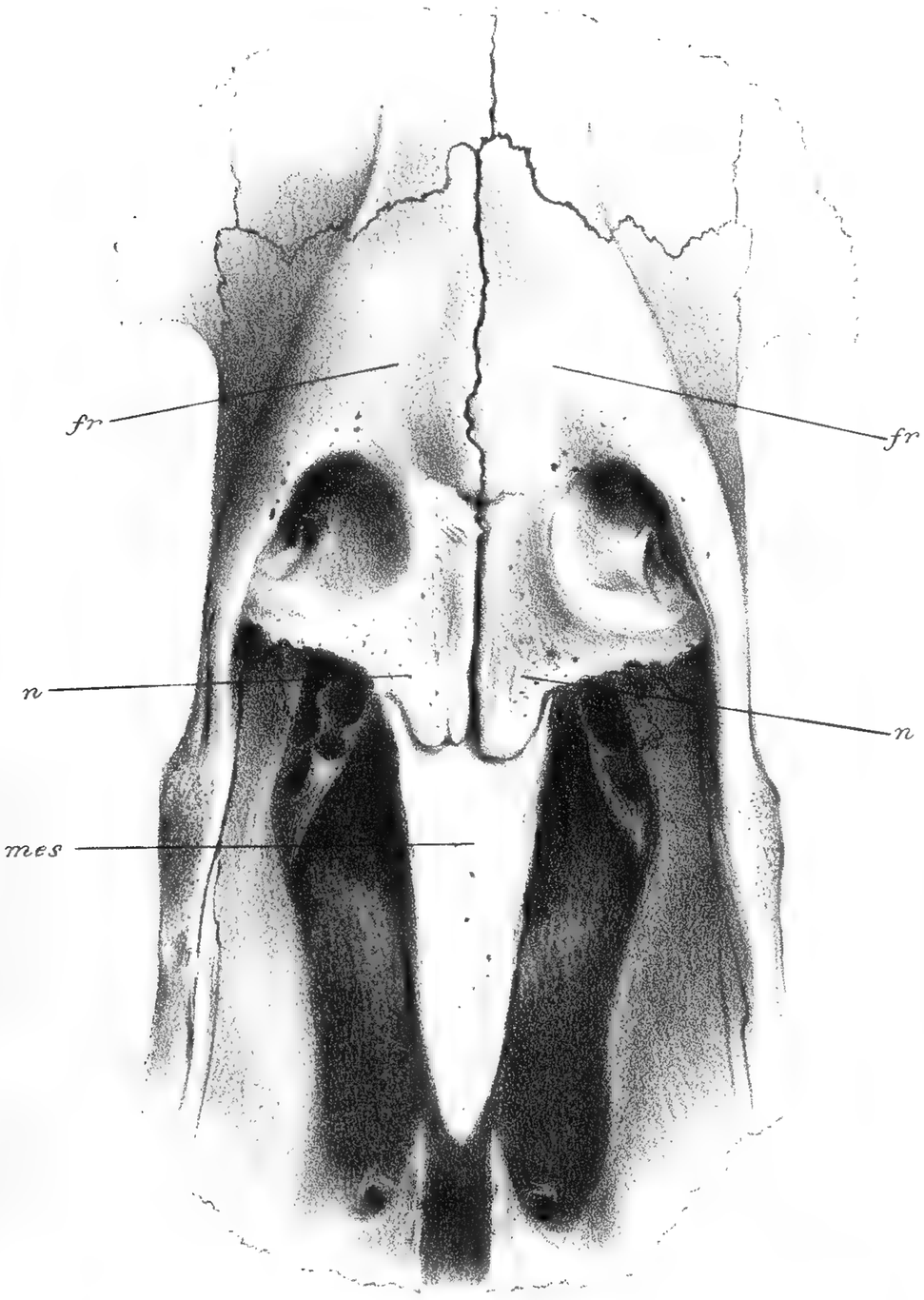
Hanhart imp. 141

J.W.& A. Smith lith.

MANATUS AUSTRALIS.

Mammalia. Tab. 1.

G.H.& Benitz. sculp.



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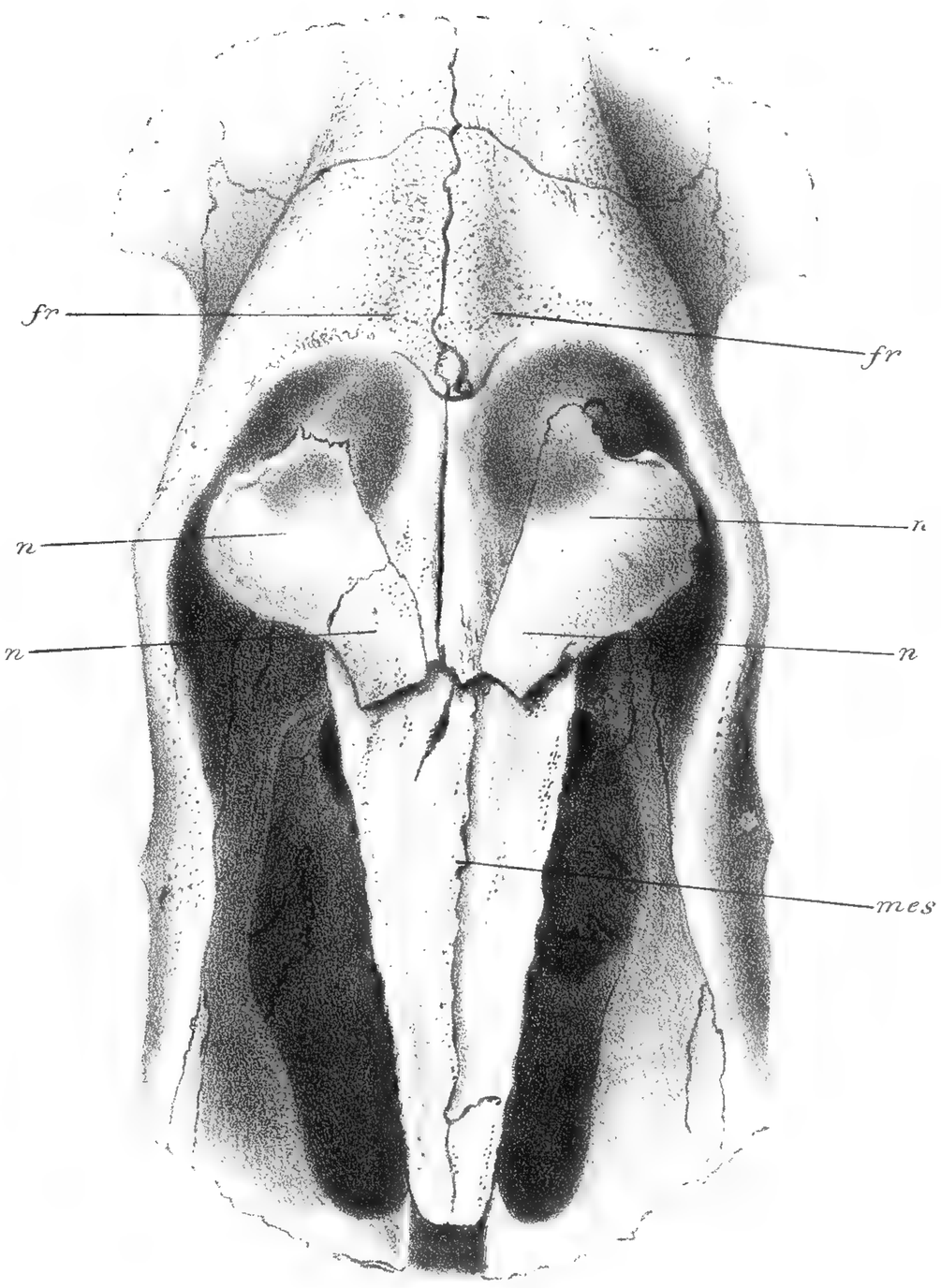

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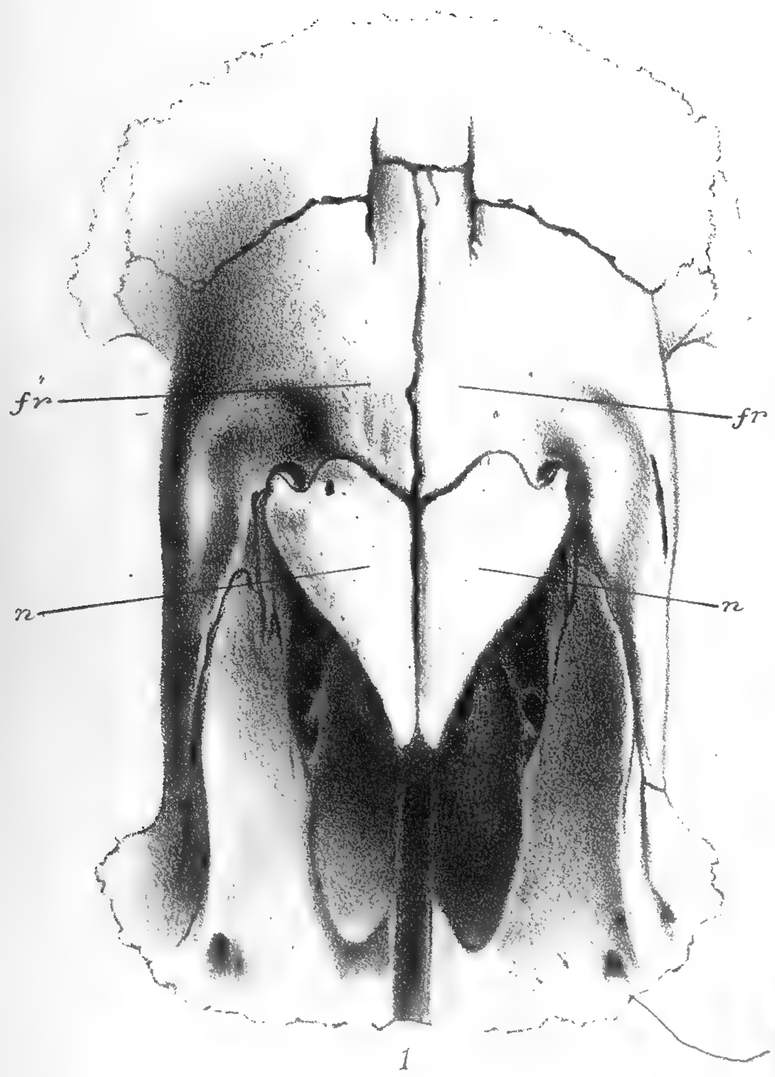

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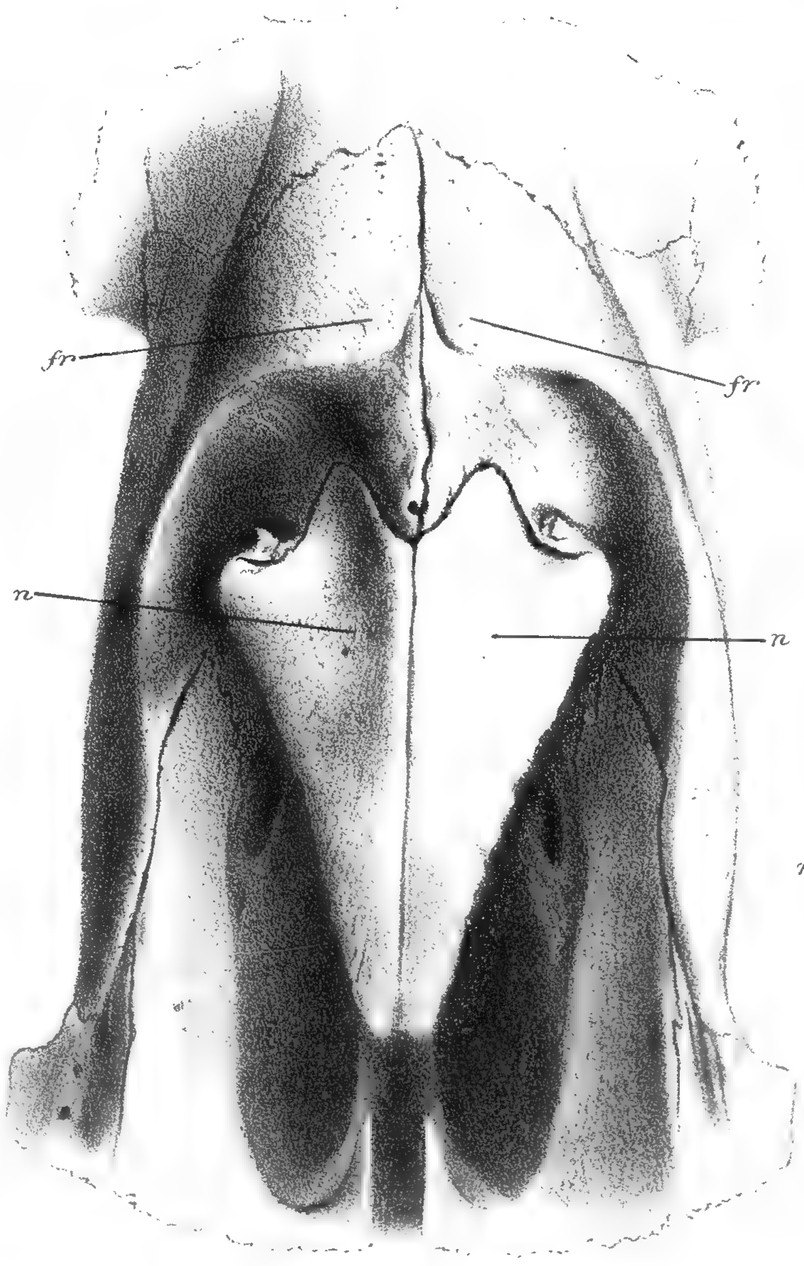

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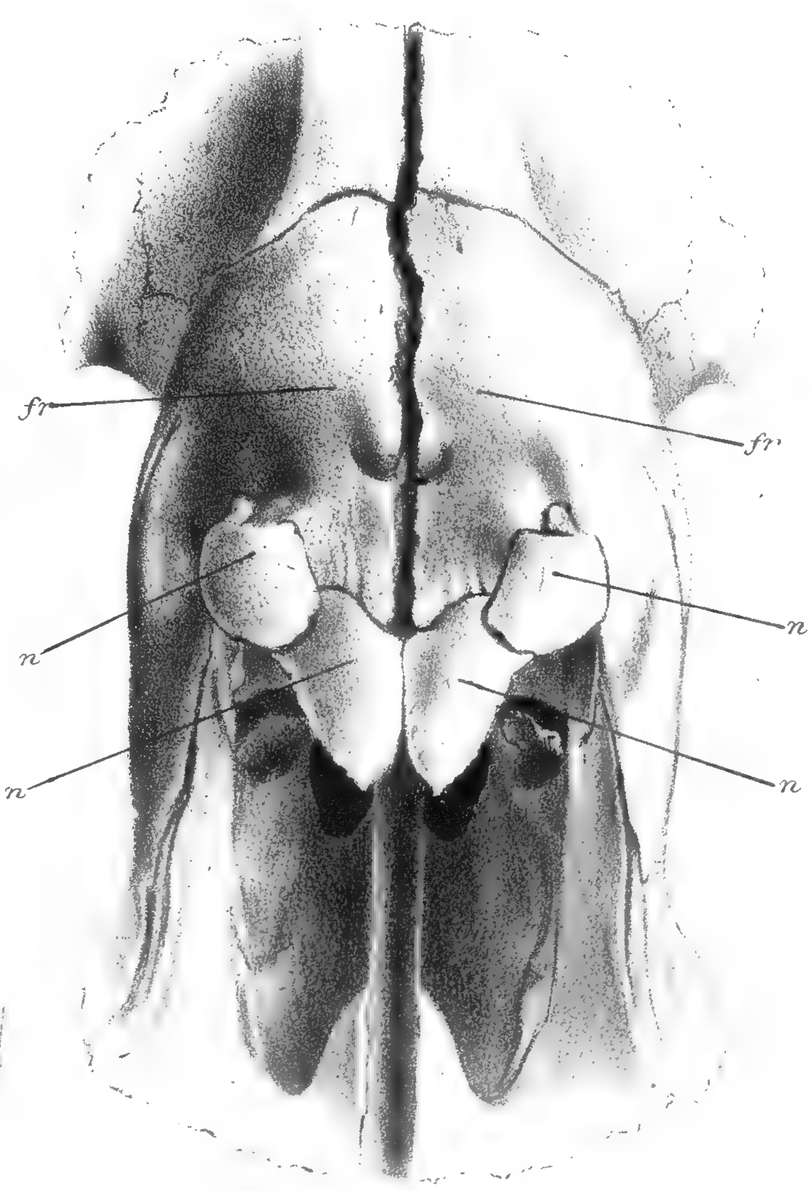

3

1,2 FRONTAL AND NASAL BONES OF TAPIRUS BAIRDI.

3,4,5 „ „ „ „ „ „ DOWI.

J.Smit lith

Hanhart imp
213

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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TAPIRUS DOWII.

Mammalia. Pl. XV.

Gould, del. et lith.

J. & C. Kendleman's Lith.

Hasell, Coley & Co. Imp.

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Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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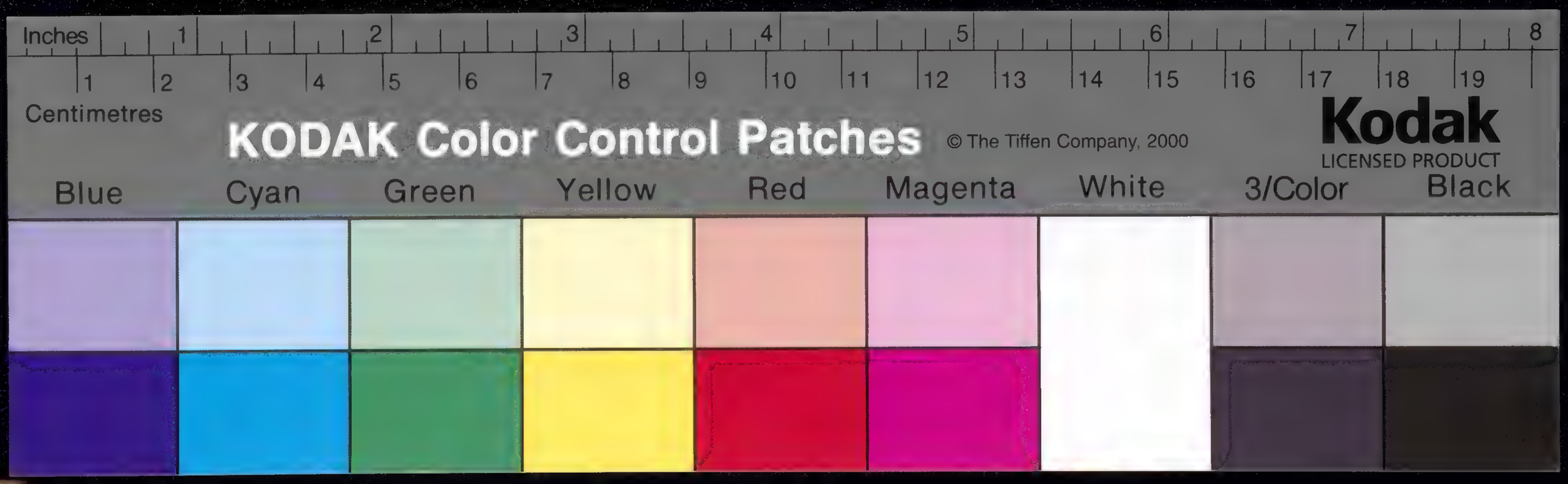
DICOTYLES LAEIATUS.

J.Wolf del. J.Smit lith.
Hanhart imp.
217



SCIURUS VARIEGATUS

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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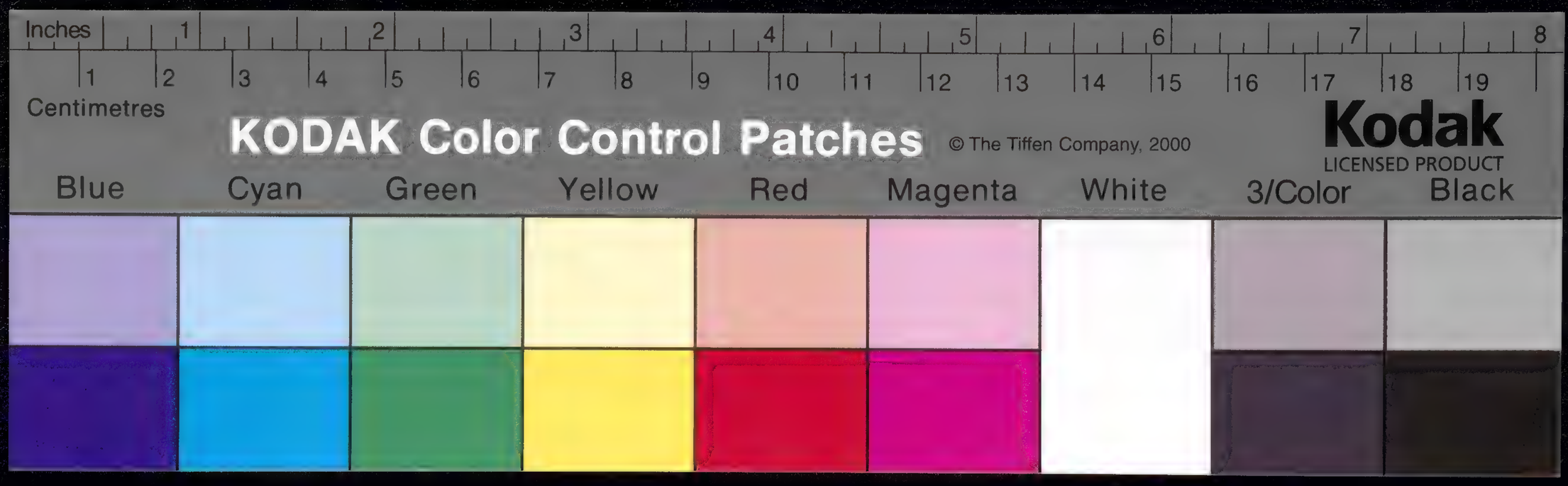
J.G. Keulemans lith. M. & N. Hanhart imp.

SCIURUS HYPOPYRRHUS, *Wagn.*

Sciurus Hypopyrrhus, Wagn. *Mammalia (Tab. 12.*



J. J. Audubon del. et lith.

Printed by J. T. Bowen, Philada.

SCIURUS GRISEOGENIS

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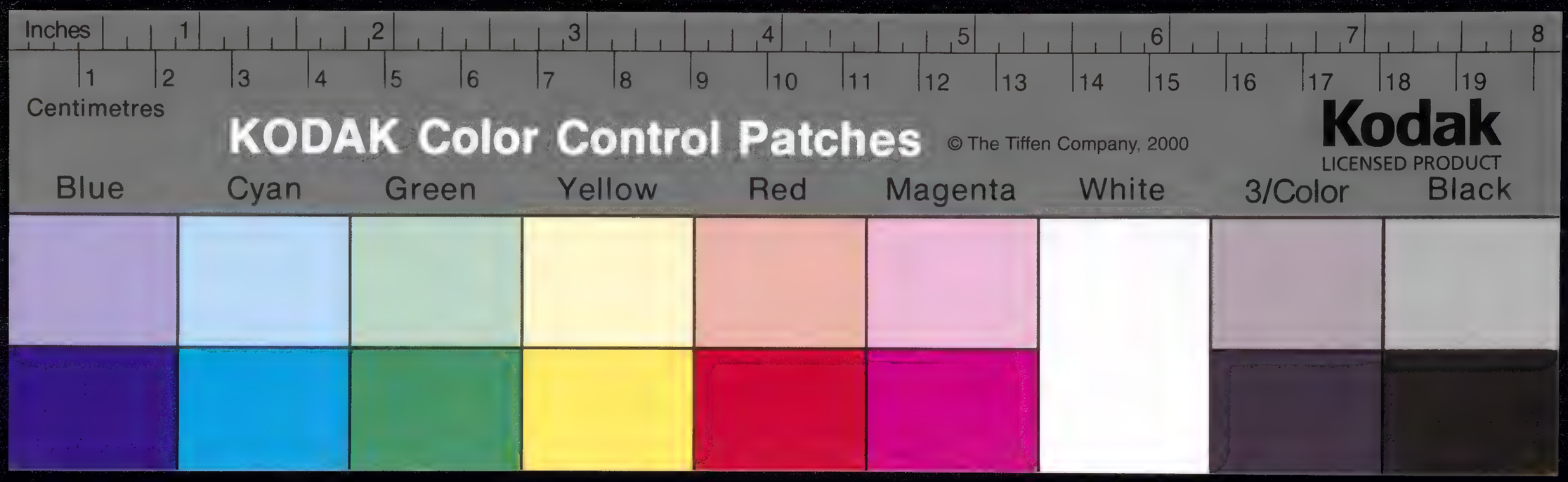
M&N Hanhart imp
112



1 HYSTRIX CRISTATA, LIN. GUINEA

2 " SUMICHRASTI

2

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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J Smit lith

2

1 HESPEROMYS COUESI 2 H. PANAMANSIS.

Mammalia, Pl. 4.

Hanhart's imp

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Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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Hanhart imp 92

NEOTOMA FERRUGINEA.

F.Smit lith.

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Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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PETAUROMYS DESMARESTIANUS
LONGICAUDATUS

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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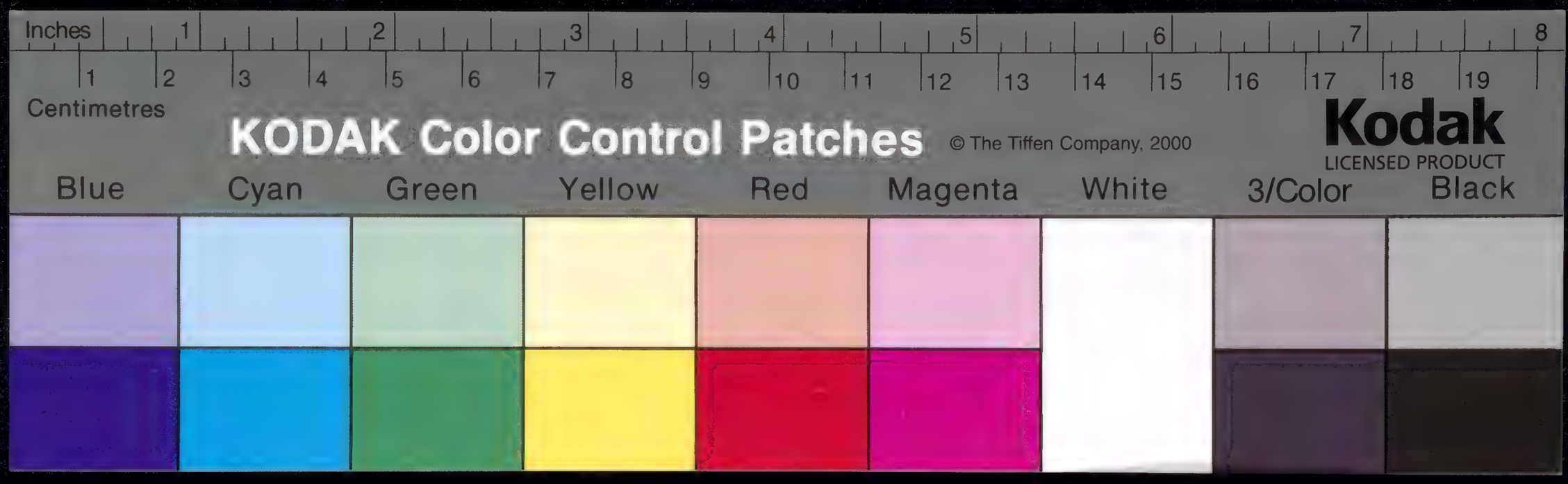
J.G. Keulemans lith.

1. DASYPROCTA MEXICANA. 2.3. D. ISTHMICA

M & N Hanhart imp.

Mammalia Tab. 18.


Inches
1
2
3
4
5
6
7
8
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Centimetres
KODAK Color Control Patches
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Kodak
LICENSED PRODUCT
Blue
Cyan
Green
Yellow
Red
Magenta
White
3/Color
Black

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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J. Smit lith.

TATUSIA NOVEM CINCTA, *var.*

Mammalia. Tab. [illegible].

Hazenart imp.

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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J.Smit lith.

Mammalia Tab. XI.

DIDELPHIS CINEREA.

Hanhart imp.
147

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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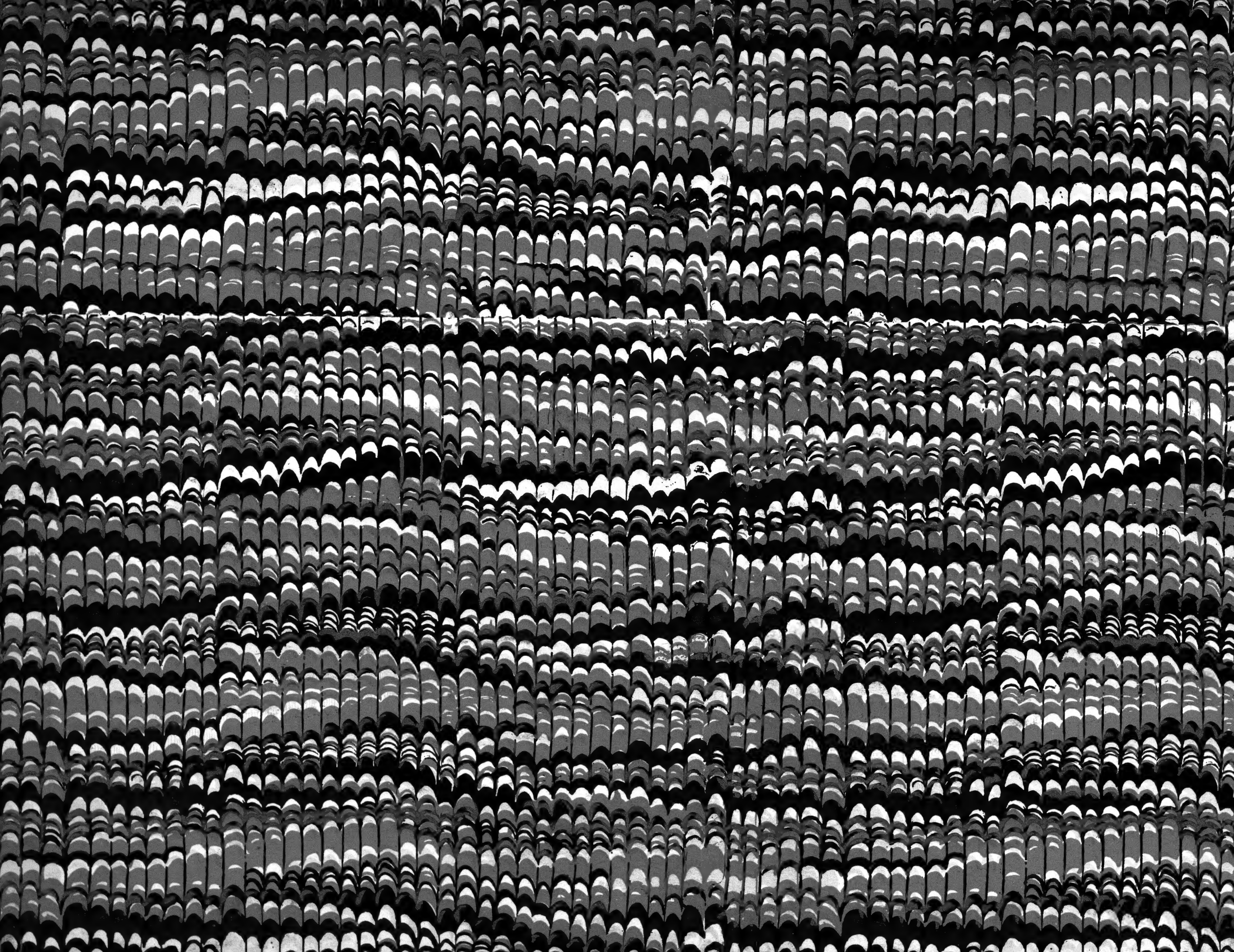
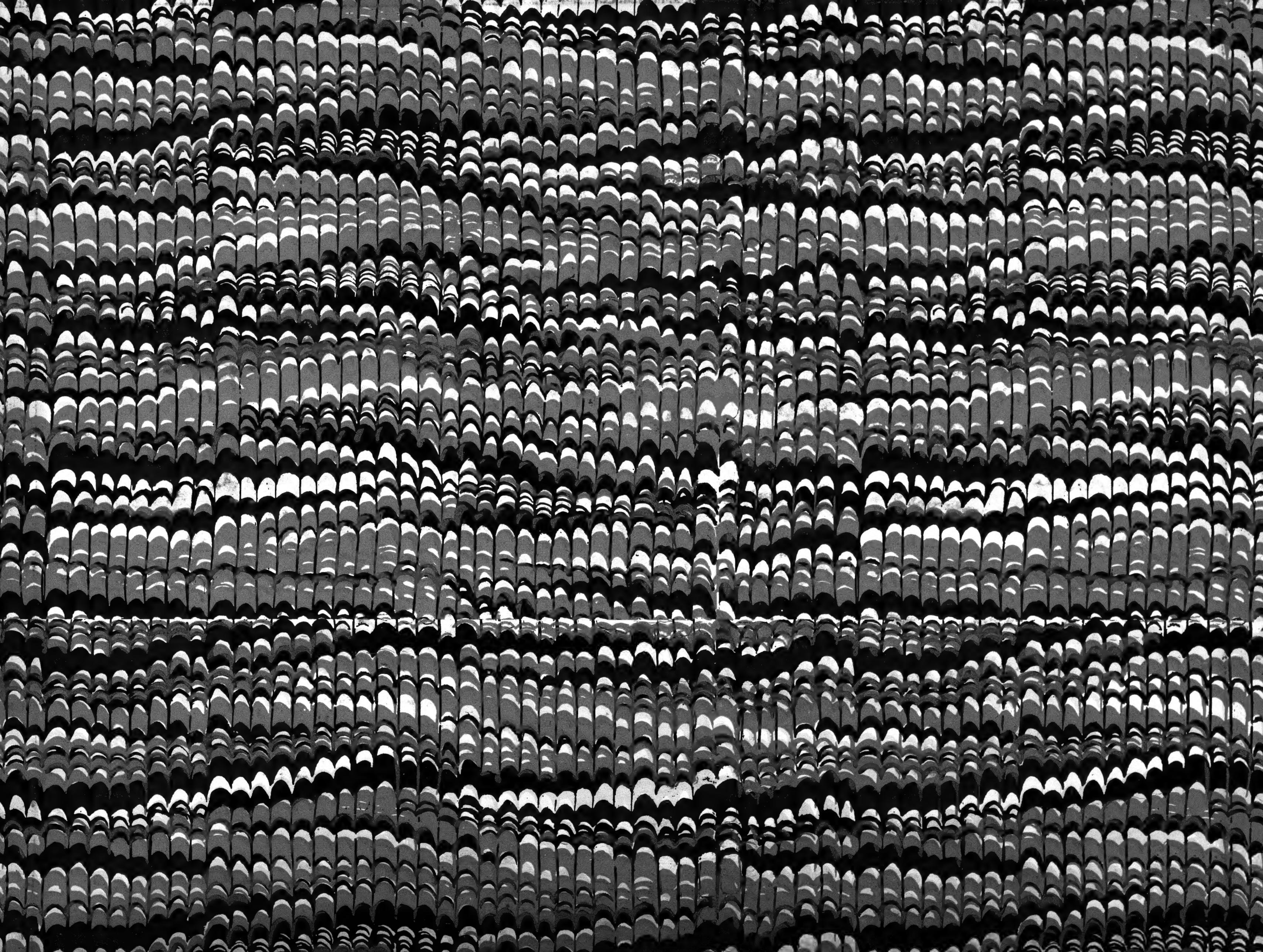
DIDEPHIS DERBIANA.





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